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Study of biochemical parameter in canine parvo virus infected canines

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Abstract

Canine Parvovirus infection is highly fatal infectious disease and caused by type-2 canine parvovirus characterized by gastroenteritis or hemorrhagic gastroenteritis with vomiting and fever. In canine parvovirus infection causes mortality up to 10% and a high morbidity up to 100%. The research was performed on clinical case of canine parvo virus infection. The 24 dogs were selected on the basis of clinical symptoms such as acute vomiting and dysentery and Confirmatory test like Hemagglutination Inhibition Test (HI), Enzyme Linked Immunosorbent Assay (ELISA) and cardiac Troponin-I. Biochemical parameters such as alkaline phosphatase, total serum protein, albumin, globulin and AG ratio, were included in the research. Study of biochemical parameter showed that a significant increase alkaline phosphatase where as, significantly decrease was noticed in total serum protein, albumin, globulin and AG ratio.

Keywords: Parvovirus infection, total serum protein, alkaline phosphatase, albumin, globulin and ag ratio.

Introduction

Canine Parvovirus infection is highly fatal infectious disease and caused by type-2 canine parvovirus characterized by gastroenteritis or hemorrhagic gastroenteritis with vomiting and fever. The first report Canine parvovirus infection was in USA (Eugster & Nain, 1977) [8]. Canine parvovirus infection is of two forms (CPV-1 and CPV-2). The virus was classified on the basis of position of amino acid. After the first report of the disease in India, prevalence of disease has been found increasing during recent past (Banja *et al.*, 2002) [2] in vaccinated dogs. The canine parvovirus causative agent belongs to genus *Parvovirus* and *Parvoviridae* family (Touihri *et al.*, 2009) [14]. The genome is single stranded DNA having size of 5.2Kb (Perez *et al.*, 2007) [10]. In canine parvovirus infection causes mortality up to 10% and a high morbidity up to 100% (Appel *et al.*, 1978) [1]. Maximum prevalence of canine parvo virus infection is seen young puppies between 1-4 months of age and less prevalence is recorded in adult dogs. Most adult dogs are immune to the disease either via natural infection or immunization.

A presumptive diagnosis of canine parvo virus infection can be made based on the clinical sign such as depression, vomiting, diarrhoea, anorexia and fever. The diagnosis can also be done on the basis of fever, loss of appetite, dehydration, smelly bloody diarrhea although a lot of work has been conducted in parvo virus infection, pertaining to their epidemiology, diagnosis, treatment and control, but still there is high mortality in clinical cases. Present study is undertaken to evaluate the biochemical change in parvo virus infected dog in comparison of healthy dog.

Materials and methods

The proposed research was carried out at the Department of Veterinary Medicine, BVC, Patna. The research was performed on clinical case of canine parvo virus infection. Biochemical parameters like alkaline phosphatase, total serum protein, albumin, globulin and AG ratio, were included in the research. All the procedure of the investigation was approved by the local institutional ethical committee. This study was conducted on 600 dogs presented at OPD of veterinary medicine, BVC, Patna from September 2018 to July 2019 of different breeds, ages, sex, vaccinated and un-vaccinated dogs. The 24 dogs were selected on the basis of clinical symptoms such as acute vomiting and dysentery. In 24 dogs, six dogs were selected as health in which, there is no any clinical symptoms. Healthy dogs were kept in group D. Rest animals were randomly divided in three groups A, B and C. Group D was kept as control

and other groups were treated with different protocol. The history of the animals was collected with respect to the immunization status especially the date of vaccination against canine parvo virus, duration of present illness, presence of blood in the vomitus, colour of the faeces and appetite. Clinical investigation included rectal temperature, heart rate and respiration rate. Visible mucus membrane viz. conjunctival mucous membrane was examined and dehydration status was ascertained by state of dryness of nostrils and skin tenting time. Behaviour and physiological condition of body were also observed during the clinical examination. Confirmatory test like Hemagglutination Inhibition Test (HI), Enzyme Linked Immunosorbent Assay (ELISA) and cardiac Troponin-I also carried out to conform parvo virus infection.

Four ml of blood collected from the saphenous vein of suspected dog with the help of 5ml sterile syringe. Blood was transferred to centrifuge tube and kept at room temperature without any disturbance for two hours to allow the serum to effuse. The serum was separated by centrifugation at 3000 rpm for 15 minutes. The serum was stored at -20°C until use for Total Serum Protein (TSP), Alkaline Phosphatase (ALP), Albumin, Globulin, AG Ratio. Estimation of Total Serum Protein was carried out from serum by direct biuret method (Doumas and Watson, 1971) [7] using a total protein kits (Coral clinical systems Goa, India). The values were expressed in g/dl. Alkaline phosphatase estimated from serum by Mod. Kind & King's Methods using alkaline phosphatase kits (Coral clinical systems Goa, India). The values were expressed in KA units. Albumin was estimated from serum by bromocresol green methodology using an albumin kit (Coral clinical systems Goa, India). The values were expressed in g/dl. Globulin was estimated from serum by method total protein kit and the values were expressed in g/dl. Albumin: Globulin ratio (A: G) was calculated as the ratio of the albumin (g/dl) and globulin (g/dl). (Coral Clinical Systems Goa, India).

Results and Discussion

Twenty-four apparently infected and healthy dogs irrespective of age, sex and breed were taken randomly to severe as healthy control group. All the dogs taken as infected and control group were inspected and examined. They were clinically healthy, active, alert and had normal appetite, defecation and urination. While clinical observation of CPV affected dogs showed vomiting, anorexia, hemorrhagic diarrhoea, paleness of mucous membrane, dullness, depression and restlessness. The mean values of various vital parameters such as healthy control group were rectal temperature; heart rate and respiration rate were 101.40 ± 0.15°F, 83.00 ± 2.50 per min. and 34.75 ± 2.28 per min respectively. While in CPV affected dogs it were 102.85±0.25, 90.00±2.50/minutes and 40.50±2.50/minutes respectively. Thus, in the CPV affected dogs the value of heart rate and respiration rate were significantly higher than that of healthy control group.

Variation in Alkaline phosphatase values of different group are depicted in table. The ALP value of infected groups were significantly (p≤0.05) higher in comparison to healthy control group D. The mean values of infected group A, B and C were 197.27±16.80, 276.65±20.00 and 256.07±14.73 respectively which were high in comparison to healthy group 170.60±36.

Table 1: Mean±SE Alkaline Phosphatase (IU/L)

Group	Pre treatment	Post treatment
A	197.27 ^{bc} ±16.80	173.08 ^b ±7.76
B	276.65 ^c ±20.00	191.46 ^c ±5.16
C	256.07 ^c ±14.73	197.97 ^{bc} ±5.37
D (control)	170.60 ^a ±0.36	170.60 ^a ±0.36

*different superscript differs significantly (p<0.05)

Significantly increase in ALP 276.65±20.00IU/L which may occur as a result of hepatic hypoxia secondary to severe hypovolemia or the absorption of toxic substances due to loss of the gut barrier. Increase value of ALP in dogs having hepatic dysfunction.

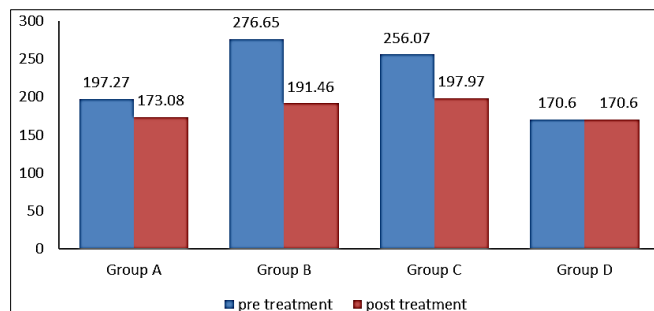


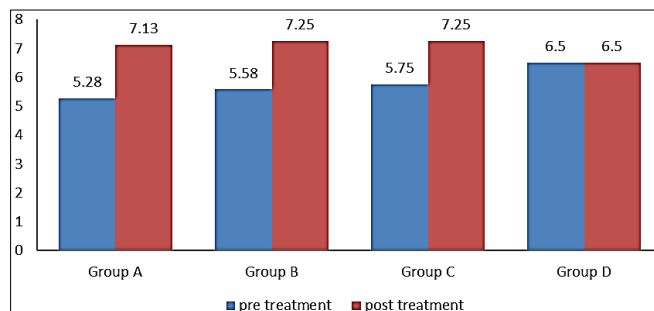
Fig 1: Alkaline Phosphatase (IU/L)

After treatment marked reduction in ALP were found in groups A, B and C and the mean value of ALP 173.08±7.76, 191.46±5.16 and 197.97±5.37 for these groups vary significant (p≤0.05) comparing with healthy groups showing positive response in different treatment groups. Macintire *et al.*, (1997) [9], Weiss *et al.*, (1999) [15] and Baruah *et al.*, (2007) [3] findings shows increase in ALP (352.92 IU/L) which may occur as a result of hepatic hypoxia secondary to severe hypovolemia or the absorption of toxic substances due to loss of the gut barrier.

Table 2: Mean±SE Total Serum Protein (g/dl)

Group	Pre treatment	Post treatment
A	5.28 ^a ±0.10	7.13 ^b ±0.02
B	5.58 ^{ab} ±0.09	7.25 ^b ±0.07
C	5.75 ^b ±0.13	7.25 ^b ±0.05
D (control)	6.50 ^b ±0.10	6.50 ^b ±0.10

*different superscript differs significantly (p<0.05)



2. Total Serum Protein (g/dl)

The total serum protein (g/dl) mean value of pre-treatment of infected groups A, B, and C was 5.28±0.10, 5.58±0.09 and 5.75±0.13 g/dl respectively, which was significantly lower(p≤0.05) than the control group.

After treatment the mean value TSP (g/dl) group A, B, and C were 7.13±0.02, 7.25±0.07, 7.25±0.05 respectively. Although

was higher than the control group but it was non-significant ($p \leq 0.05$).

There was hypoproteinemia in this study which is findings of supported by Ramprabhu *et al.*, (2002) [10] and Dharmadheeran *et al.*, (2003) [5]. Hypoproteinemia might be due to the leakage of serum protein through damaged capillaries of the villi of intestine and also due to less absorption through the damaged villi (Biswas *et al.*, 2005) [4].

Table 3: Mean±SE Albumin (g/dl)

Group	Pre treatment	Post treatment
A	2.38 ^a ±0.13	3.65 ^{ab} ±0.01
B	2.39 ^a ±0.07	3.71 ^b ±0.05
C	2.40 ^a ±0.06	3.72 ^b ±0.05
D(control)	3.51 ^b ±0.82	3.51 ^{ab} ±0.82

*different superscript differs significantly ($p < 0.05$)

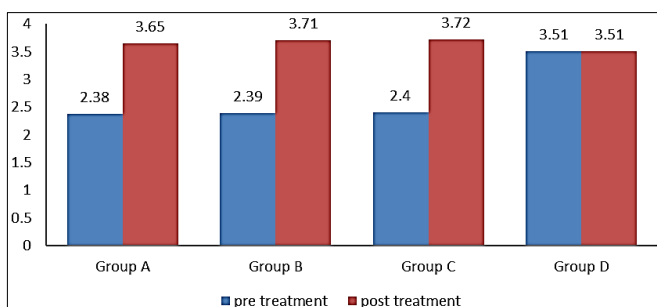


Fig 3: Albumin (g/dl)

The mean serum albumin levels of dogs infected with parvovirus group A, B, and C was 2.38±0.13, 2.39±0.07 and 2.40±0.06 respectively, which was significantly ($p \leq 0.05$) lower than healthy control groups.

After treatment the mean value of Albumin (g/dl) in group A, B, and C were 3.65±0.01, 3.71±0.05 and 3.72±0.05 g/dl respectively non-significant but higher value in all treatment groups were observed in comparison to healthy control group. Similar justification was given by Sagar *et al.*, (2008a) [11] who reported that hypoalbuminemia is more specific in canine parvovirus due to protein loss through the gastrointestinal tract. Hypo albuminemia in CPV infected dogs were attributed to anorexia, vomiting and diarrhoea which lead to the losses of fluid and electrolytes.

Table 4: Mean±SE Globulin (g/dl)

Group	Pre treatment	Post treatment
A	2.90 ^a ±0.06	3.48 ^b ±0.03
B	3.18 ^{ab} ±0.13	3.53 ^b ±0.02
C	3.35 ^b ±0.12	3.46 ^b ±0.13
D (control)	3.33 ^b ±0.07	3.33 ^b ±0.07

*different superscript differs significantly ($p < 0.05$)

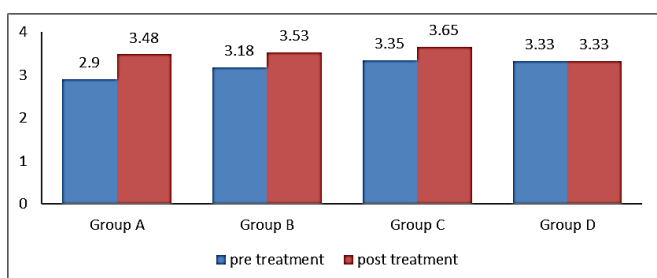


Fig 4: Globulin (g/dl)

The mean serum globulin levels of dogs infected with parvovirus group A, B, and C was 2.90±0.06, 3.18±0.13 and 3.35±0.12 respectively, which was significantly ($p \leq 0.05$) lower than healthy control groups.

After treatment the mean value of globulin (g/dl) in group A, B, and C were 3.48±0.03, 3.53±0.02 and 3.46±0.13 respectively. However, non-significant ($p \geq 0.05$) increases was noticed as compared to control group.

The present findings are in agreement with Biswas *et al.*, (2005) [4], Baruah *et al.*, (2007) [3] and Sagar *et al.*, (2008b) [12], who reported significantly lower level of protein, albumin and globulin in CPV infected dogs. Hypoglobulinemia is more common in myocardial and occasionally the gastroenteritis form of disease.

Table 5: Mean±SE AG ratio (g/dl)

Group	Pre treatment	Post treatment
A	0.82 ^a ±0.05	1.04 ^b ±0.01
B	0.75 ^a ±0.05	1.04 ^b ±0.01
C	0.71 ^a ±0.03	1.16 ^b ±0.06
D (control)	1.05 ^b ±0.03	1.05 ^b ±0.03

*different superscript differs significantly ($p < 0.05$)

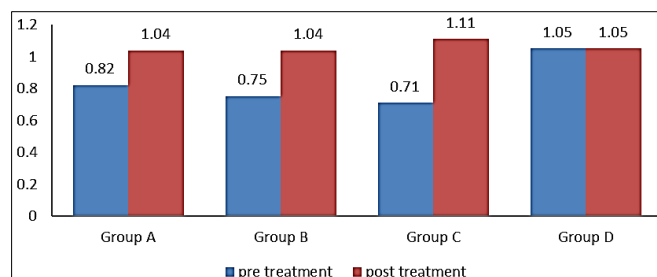


Fig 5: AG ratio (g/dl)

The mean serum A/G ratio levels of dogs infected with parvovirus group A, B, and C was 0.82±0.05, 0.75±0.05 and 0.71±0.03 respectively, which was significantly ($p \leq 0.05$) lower than control groups.

After treatment the mean value of A/G ratio (g/dl) in group A, B, and C were 1.04±0.01, 1.04±0.01 and 1.16±0.06 respectively. However, non-significant ($p \geq 0.05$) increases was noticed as compared to control group.

The present findings are in agreement with Biswas *et al.*, (2005) [4], Baruah *et al.*, (2007) [3] and Sagar *et al.*, (2008b) [12] who also reported the decrease in albumin and increase in globulin in hepatobiliary disorders lead to decrease in Albumin: Globulin (A: G) ratio.

Conclusion

Biochemical parameters showed that a significant increase alkaline phosphatase whereas significantly decrease was noticed in total serum protein, albumin, globulin and AG ratio.

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