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RESEARCH ARTICLE

IMPACT OF HAEMORRHAGIC GASTROENTERITIS ON HB, TEC, PCV AND ERYTHROCYTIC INDICES

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ABSTRACT

Background: Haemorrhagic gastroenteritis is a highly contagious disease, which is often fatal. Causative agents of the disease are viruses, bacteria, endo-parasites and even food allergy as well as irritant drugs. Out of these, Canine Parvo Virus has emerged as a major cause of gastroenteritis in dogs. Clinical signs of the disease include fever, vomiting and severe bloody and foetiddiarrhoea with marked dehydration.

Aim: Present study was conducted to evaluate alterations in the Hb concentration, TEC, PCV andErythrocytic Indices in twenty six dogs.

Methodology: The study was conducted by taking 26 canines male and female out of which thirteen were infected with gastroenteritis and the rest were taken as control groups. The haematological parameters were screened by standardized procedure to stratify the difference between two groups.

Results and Conclusion: The haematological analysis of diseased dogs revealed low values of haemoglobin, total erythrocyte count and packed cell volume. However, no significant difference was noticed in mean values of MCV, MCH and MCHC. Hence, there is no doubt that the findings of the present study would encourage the people to pay attention towards the general health of their pets

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INTRODUCTION

Haemorrhagic gastroenteritis is a common disease of multiple etiologies seen in all breed and age groups of dogs. Causative agents responsible for haemorrhagic gastroenteritis are viruses such as Parvo Virus, Corona Virus and Rota Virus; bacteria like *Salmonella* spp., *Escherichia coli*, *Clostridium* spp.; endoparasites such as *Dipyllidiumcaninum, Ancylostomacaninum*; food allergy and irritant drugs (Sharma *et al.,* 2008). Canine Parvo Virus belongs to family Parvoviridae, subfamily Parvovirinae and genus Parvovirus. The original viral strain, designated as canine parvovirus 2 (CPV-2), is distinguished as the novel virus from the previously known CPV-1 or minute virus of canines(MVC), that caused hemorrhagic gastroenteritis, pneumonia and subacute myocarditis in kennels and shelters worldwide (Behera *et al.,* 2014). Canine Parvo Viral infection is usually associated with puppies under 6 months old. In India canine parvovirus enteritis has got an emerging status. Certain breeds like German shepherd, Labrador and Spitz are reported to be at higher risk of parvoviral enteritis, whereas Mongrel is lesssusceptible (Sagar *et al.,* 2008). Various factors like bacterial and viral infections, parasitic infestations, irritant drugs, dietary errors, ingestion of toxic materials etc. have been reported to be associated with canine enteritis (Ettinger *et al.,* 2010). Clinical signs include fever, vomiting and severe bloody and foetid diarrhoea with marked dehydration. Weight loss or stunting is seen in dogs that are more severely affected (Hall*et al.,*2011).Factors that predispose to parvoviral infection in puppies are lack of protective immunity, intestinal parasites, overcrowding, unsanitary and stressful environmental conditions (Parthiban *et al.,*2016). However, observation of clinical signs and evaluation of haematological parameters help to determine the general level of health in animals, distinguishing them from diseased ones (Coles, 1986). Alterations in these parameters have been also observed between tropical and temperate animals (Ariyibi *et al.* 2002).These variations were thought to be due to the effect of climate, nutrition and sub clinical state of animals (Dash *et al.* 2013).Therefore, the present study was planned to determine the alterations in Hb concentration, TEC, PCV and Erythrocytic Indices between gastroenteritis infected dogs and healthy dogs.

MATERIALS AND METHODS

Dogs exhibiting signs of vomiting and foul smelling bloody diarrhoea were selected for the study from the Teaching

Veterinary Clinical Complex (TVCC), College of Veterinary Science and Animal Husbandry, OUAT, Odisha. A total of twenty six males and females of Labrador, Spitz, German Shepherd dogs and descript breeds aging between 5 months to 12 years were screened for the study. Out of which thirteen canines were naturally infected with parvoviral gastroenteritis and thirteen apparently healthy dogs were selected randomly ascontrol. Two milliliters of blood samples were collected from the dogs from saphenous vein in EDTA vacutainers. Haematological parameters of canine gastroenteritis and healthy dogs were studied using standard methods such as haemoglobin (Hb) by Sahli's acid haematin method, total erythrocyte count (TEC) by Haemocytometer and Packed Cell Volume (PCV) by Microhaematocrit method. The erythrocyte indices were estimated by using formula as MCV in fl = (PCV/RBC in millions/cubic mm) ×10, MCH in pg = (Hb in gms/dL/RBC in millions/cubic mm) ×10and MCHC% = (Hb in gms/100ml/PCV) ×100.Data obtained during the course of analysis were statistically analysed to assess significant heterogeneity between healthy and gastroenteritic dogs by using Independent Samples T-Test at 5% level. All data were expressed as mean ± standard error of means. Differences were considered to be significant, when the *P* values were less than 0.05. The analysis was performed by using data analysis of Microsoft windows excel package.

$$Standard\ Error = \frac{\sqrt{Variance}}{\sqrt{n}}$$

RESULTS

Total erythrocyte count: The total erythrocyte count in canine gastroenteritis was found to be lower than healthy dogs and ranged between 2.42 to 6.95 million per cubic mm with average value of 4.02 millions. TEC ranged from 4.1 to 6.01 million per cubic mm in healthy control dogs with mean value of 4.87 million per cubic mm (Table-1, Fig-1).

Haemoglobin concentration (Hb): It was found that dogs suffering from haemorrhagic gastroenteritis have lower haemoglobin concentration than that of healthy dogs. In healthy dogs the highest Hb concentration was measured as 14gm/dl and lowest value was found to be 9.4gm/dl with mean value of 12.32gm/dl. In haemorrhagic gastroenteritis affected dogs the haemoglobin concentration ranged from 7.0 to 21gm/dl with a mean value of 8.74gm/dl (Table-1, Fig-2).

Table 1. Haematological values of healthy and gastroenteritis infected canines (n=26)

Parameters	Healthy canines		Gasrtoenteritis canines	
	Mean±SE	Observation range	Mean±SE	Observation Range
Hb(gm/dl)	12.32±0.34	9.4-14	8.74±1.03**	7.0-21
TEC (×10^{6}µl)	4.87±0.16	4.1-6.01	4.02±0.32*	2.42-6.95
PCV (%)	42.75±1.88	35.59-56.67	32.13±2.15**	21.31-54.23
MCV (fl)	88.47±3.96	63.78-118.06	82.19±4.38	56.98-10.71
MCH (pg)	25.44±0.65	22.65-29.97	22.11±1.67	13.98-35.54
MCHC (%)	29.16±0.89	24.7-32.36	26.96±1.53	20.97-38.72

* Significant at 5% level (p<0.05); ** Significant at 1% level (p<0.01)

Packed cell volume: The PCV ranged from 21.31 to 54.23% in gastroenteritis infected canines with mean packed cell volume percentage of 32.13%.However, healthy dogs have higher PCV ranging from 35.59 - 56.67% with mean of PCV 42.75% (Table-1, Fig-3).

Erythrocyte indices: In canine gastroenteritis, erythrocyte indices such asMCV, MCH and MCHC were calculated as 82.19±4.38, 22.11±1.67 and 26.96±1.53 respectively. Healthy dogs were found to have higher erythrocyte indices as MCV, MCH and MCHC were 88.47±3.96, 25.44±0.65 and 29.16±0.89 respectively (Table-1). The mean Hb concentration between healthy and haemorrhagic gastroenteritis dogs were significantly different at (p<0.01). The mean TEC was also decreased significantly (p<0.05) in the gastroenteritis infected dogs. Healthy and gastroenteritis canines exhibited highly significant difference of PCV at (p<0.01). Similarly, no significant difference at (p<0.05) were observed for mean MCV, MCH and MCHC values between healthy and haemorrhagic gastroenteritis dogs.

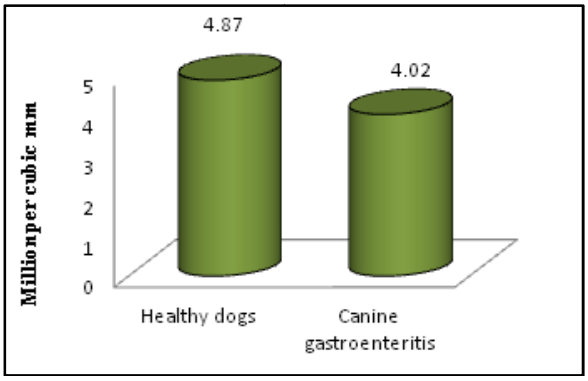

Figure 1. Total Erythrocyte count of healthly and gastroenteritis canines

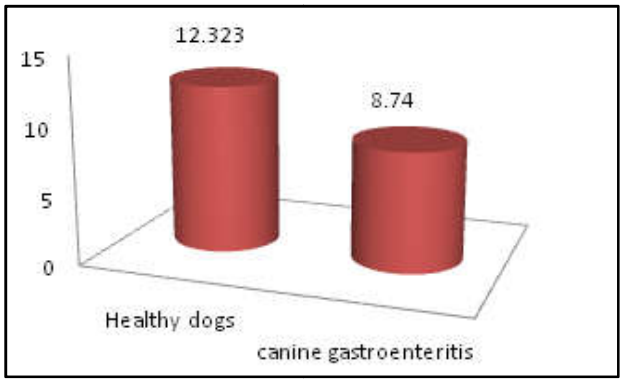

Figure 2. Haemoglobin concentration of healthy and gastroenteritis canines

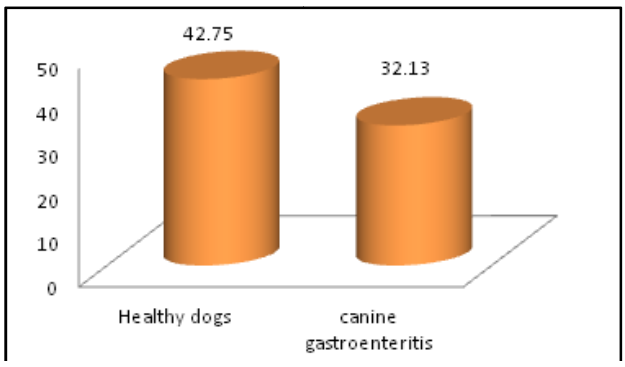

Figure 3. Packed cell volume of healthy and gastroenteritis canines

DISCUSSION

Canine parvovirus enteritis is recognized as highly contagious and often fatal disease in veterinary pediatrics especially in

canine. According to Shah *et al.,* (2013) the initial clinical signs are nonspecific like anorexia, lethargy, depression, fever and later manifested with typical signs of vomiting and diarrhoea that varies from mucoid to haemorrhagic. Zafar *et al.,* (1999) observed varieties of clinical signs including vomiting and haemorrhagicdiarrhoea. In this disease severe vomiting and bloody diarrhoea leads to dehydration, alteration in body electrolyte balance and haematological parameters. Generally, the death occurs due to severe anaemia, which might be due to damage of vascular epithelium of intestine. The present study recorded the mean hemoglobin concentrations as 8.74±1.03 gm/dl in parvoviral infected dog, where as it was 12.32±0.34 gm/dl in healthy dogs. Hence, infected dogs showed a significant ($P<0.01$) decrease in Hb level. Such significant reduction in Hb level is due to severe loss of blood from body (Sagar *et al.,* 2008).TEC was also found to be decreased significantly ($p<0.05$) in canine gastroenteritis than healthy canines (Salem, 2014). According to Sulthana (2015) the reduced mean TEC value might be due to damage of capillaries of villi in the intestine leading to haemorrhages. The mean PCV was found to decreased significantly ($P<0.01$) in the CPV infected dogs and the finding simulated with the findings of Sagar *et al.,* (2008). The decreased value of PCV is due to the haemorrhage and blood loss through the faeces and vomitus in the disease (Behera *et al.,* 2014) and due to damage of vascular epithelium of the intestine (Zafar *et al.,* 1999). Blood loss through faeces is associated with haemo-dilution resulting from absorption of fluid from the intestinal tract and compensatory reabsorption of water by the kidney (Zafar *et al.,* 1999).The present study also revealed that the MCV value was within normal range, but MCH and MCHC were decreased in gastroenteritis infected canines, which might be due to microcytichypochromic anaemia. This contradicts the findings of Zafar *et al.,* (1999), who stated that the increased MCV value might be due to macrocytic normochromic anaemia.

Summary: The dogs with Haemorrhagic Gastroenteritis infection were manifested by high risk of body temperature, vomition, bloody diarrhoea, dehydration, anorexia and depression. This is a very common infectious disease causing high risk of mortality in dogs. Alterations in haematological parameters were observed in gastroenteritis dogs with anaemia, lower TEC and PCV, when compared with healthy control dogs. Slight deviations were also observed in the mean value of MCV, MCH and MCHC in healthy and gastroenteritic canines. Statistical analysis such as t-test was conducted to find out significant difference in hematological parameters between healthy canines (control) and gastroenteritis canines. It was revealed that there was significant reduction ($p<0.01$) in Hb content, PCV and significant decrease ($p<0.05$) in TEC in gastroenteritis canines. However, no significant difference at ($p<0.05$) of eosinophil, monocyte, MCV, MCH and MCHC was observed in healthy and gastroenteritis dogs. There is no doubt that the findings of the present study would encourage the people to pay attention towards the general health of their pets. Since the disease is also caused due to nutritional mis-management, proper dietary supplementation should be provided to reduce the chance of the gastroenteritis infection. Better health care and hygiene would certainly reduce the chances of naturally occurring parvo infection.

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