RESEARCH ARTICLE

Haemato-Biochemical Alterations in Dogs with Vomition

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Abstract

Vomition is a common clinical presentation in small animal practice and may be associated with gastrointestinal and systemic diseases. Fifty cases of vomition in dogs were studied at Veterinary Clinical Complex of the College in Anand during the period of six months for clinical and haemato-biochemical alterations in comparison to 8 normal healthy dogs. Among 50 dogs, the incidence of vomiting possibly due to Parvo viral infection, pyometra, renal disorders, encylostoma infection, pseudo-pregnancy, hepatic disorders, thrombocytopenia, neutrophilia and dietary abnormalities was in 44.0, 2.0, 14.0, 14.0, 2.0, 4.0, 2.0, 14.0 and 4.0 % cases, respectively. The levels of PCV, TLC and basophils were increased significantly ($p < 0.05$) with decreased Hb in dogs suffering with vomiting as compared to healthy control group. The serum biochemical examinations revealed significantly ($p < 0.05$) decreased mean serum albumin concentration and increased serum creatinine, BUN, ALT and AST values in dogs with vomiting as compared to healthy control group. However, TEC, lymphocyes, neutrophils, eosinophils, monocytes counts and serum total protein did not vary significantly between vomiting and healthy dogs.

Keywords: Clinical signs, Dog, Haematology, Serum biochemistry, Vomition.

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Introduction

Dog (*Canis familaris*) has been the foremost devoted companion of man since time immemorial (Savolainen *et al*., 2002). With radical increase in the demand of dogs as a pet, it has been witnessed that vomition is a common clinical presentation in small animal practice. It is a challenging problem for veterinary clinicians because vomition is associated with a multitude of causes. To ensure appropriate therapy and management of vomition in dogs, it requires a rational and systematic approach with a sound understanding of the pathophysiology of vomition. Jiménez Romero (2017) stated that vomiting in canines is a functional sign that is frequently observed at an early age. Vomition occurs as a symptom in large number of diseases in dogs, among them are bacterial, viral, parasitic conditions, tumors, poisonings and obstructions, including kidney, liver, nervous, pancreatic and endocrine system ailments (Abutarbush, 2010). Rosé and Neiger (2013) categorized the causes of vomition as gastrointestinal (43.7 %), systemic (27.7 %) , non-gastrointestinal abdominal (16.4 %), neurological (1.4 %) and miscellaneous (6.1 %.) Suresh (2009) and Shah *et al*. (2013) have reported alterations in haemato-biochemical profile of dogs with gastroenteritis and vomition. Hence the present study was an attempt to evaluate the haemato-biochemical alterations in dogs with vomition.

Materials and Methods

The present study was undertaken during October 2019 to March 2020 on 50 dogs with vomition and 8 healthy dogs. All the dogs which were presented at the Veterinary Clinical Complex of the College, Anand with complain of vomition were examined properly for vomitus, haematology and serum biochemistry. The general examination included temperature, pulse and respiration rates.

Blood samples were collected aseptically in sterile plastic K_3EDTA vials using sterile needle from femoral vein or saphenous vein for estimating various haematological parameters. Blood samples (2.5 ml) collected in centrifuge tubes without anticoagulant were allowed to clot at room temperature (26 ± 2°C). Serum was harvested by centrifugation at 3000 rpm for 15 minutes at 10°C (Eppendorf 5804 R, Germany) and stored at -40°C for biochemical analysis. Haematological analysis was done by using Automatic Blood Analyzer (Abacus Junior Vet-5). Serum biochemical analysis was done using biochemical kits on CKK300 Auto-analyzer.

Based on clinical signs, haemato-biochemical profile and other tests, the affected dogs were classified into 9

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possible different etiological entities. The data obtained on haemato-biochemical parameters of affected and healthy groups were compared by using unpaired 't' test (Snedecor and Cochran, 1994).

Results and Discussion

The clinical examination revealed dehydration, dullness, melana, anxiety, tachycardia, haemetemesis, diahrroea and icteric skin, sclera and buccal mucus membrane in cases of hepatic disorders. On abdominal palpation there was mild pain in dogs affected with renal and hepatic disorders.

Among the 50 dogs under study, the incidence of vomiting due to possible Parvo viral infection, pyometra, renal disorders, encylostoma infection, pseudopregnancy, hepatic disorders, thrombocytopenia, neutrophilia and dietary abnormalities was 44.0, 2.0, 14.0, 14.0, 2.0, 4.0, 2.0, 14.0 and 4.0 %, respectively (Table 1) .

Agnihotri *et al.* (2017), Kumar and Kumar (2017) and Gupta *et al.* (2019) also observed similar etiologies in dogs presented with vomition. Suresh (2009) recorded dietary abnormalities as the most frequent cause of vomition followed by renal failure and hepatic disorders with reference to jaundice.

Haematological Alterations

In the present study, the mean value of haemoglobin was decreased significantly ($p < 0.01$), whereas packed cell volume was increased significantly in vomiting dogs as compared to the healthy dogs. The mean value of TLC ($p < 0.05$) and Basophils ($p < 0.01$) were also increased significantly in affected dogs when compared with the healthy dogs. However, the mean values of TEC and other DLC counts were found unaltered with vomiting in dogs under study as compared with the healthy dogs (Table 2).

The decreased concentration of mean Hb (mg/dl) and increased PCV (%) in affected dogs indicated anaemia and dehydration in comparison to healthy dogs and these observations simulated with the findings of Ramprabhu *et al.* (2002), Kamalpreet *et al.* (2005) and Agnihotri *et al.* (2017). Reduced values of Hb could be due to damage of the capillary of the villi of intestine leading to loss of blood, nutritional abnormalities or iron deficiency. Suresh (2009) revealed significant increase in PCV value in dogs affected with vomiting. Plunkett (2013) documented elevated PCV levels in canine haemorrhagic gastroenteritis. This increase may be due to dehydration and haemoconcentration. The mean value of TEC was observed to be unaffected in vomiting dogs. Vijaya Lakshmi (2010) and Mohanta *et al.* (2018) however observed raised TEC value in vomiting dogs. The mean value of TLC was observed to be higher in vomiting dogs in comparison to healthy control group. Ramprabhu *et al*. (2002) recorded increase in mean value of TLC in dogs affected with vomiting due to haemorrhagic gastroenteritis. Similar findings were also reported by Suresh (2009), Shah *et al*. (2013) and Mohanta *et al.* (2018). This leucocytosis might be due to secondary bacterial infection in the gastric mucosa of affected dogs. Elevated TLC values may be due to dehydration, haemoconcentration or mild infection along with basic etiology.

Among the DLC (%), the mean value of only basophils was increased significantly ($p < 0.01$) in affected dogs when compared with the healthy dogs, and there were no significant alterations in other DLC traits. Mohanta *et al.* (2018) however recorded a marked neutropenia in dogs affected with canine parvo viral gastroenteritis. Neutropenia may occur due to marked inflammation of gastric mucosa associated with nonbacterial infectious disease like parvovirus infection, which accounted for 47.1 % of all cases in an earlier study (Brown and Rogers, 2001). The non-significant difference observed in monocyte count was in accordance with Suresh (2009) and Mohanta *et al.* (2018). The increase in the mean value of eosinophil might be due to inflammation of gastric mucosa or due to secondary parasitic infestation like *Ancylostoma* as opined *by* Suresh (2009). The increased lymphocyte count can be correlated with CPV induced gastroenteritis.

Biochemical Parameters

The mean value of serum albumin was significantly ($p < 0.05$) decreased (Table 3). This decreased level of protein

Table 1: Probable etiological entities of vomiting in dogs

S. No.	*Etiology*	*No. of Animals*	*Percentage*
1	Parvo virus	22	44.00
2	Pyometra	01	2.00
3	Renal disorder	07	14.00
4	Encylostoma infection	07	14.00
5	Pseudopregnancy	01	2.00
6	Hepatic disorder	02	4.00
7	Thrombocytopenia	01	2.00
8	Neutrophilia	07	14.00
9	Dietary	02	4.00
Total		50	100.00

Table 2: Haematological findings of healthy and vomiting dogs (Mean ± SE)

Haematological Parameters	*Healthy Control (n=8)*	*Affected Group (n=50)*	*Reference value*
Hb (g/dL)	14.00 ± 0.33	11.30 ± 0.42**	12-18
PCV (%)	39.06 ± 0.62	44.69 ± 1.06**	37-55
TEC ($\times 10^6$/µl)	6.28 ± 0.18	6.26 ± 0.18	5.5-8.8
TLC ($\times 10^3$/µl)	12.82 ± 0.29	16.24 ± 1.54*	6-17
Lymphocytes (%)	23.55 ± 0.52	24.21 ± 0.55	12-30
Neutrophils (%)	70.01 ± 0.60	68.93 ± 0.73	60-70
Eosinophils (%)	1.62 ± 0.26	1.90 ± 0.22	2-10
Basophils (%)	0.15 ± 0.02	0.55 ± 0.06**	0-2
Monocytes (%)	4.69 ± 0.40	4.42 ± 0.21	3-10

*$p < 0.05$; **$p < 0.01$ between group.

Table 3: Biochemical findings of healthy and vomiting dogs (Mean ± SE)

Biochemical Parameters	*Healthy Control (n=8)*	*Affected Group (n=50)*	*Reference Range*
Total Protein (g/dL)	6.54 ± 0.15	6.37 ± 0.24	5-7
Albumin (g/dL)	3.40 ± 0.15	2.66 ± 0.08*	2.7-4.4
AST (U/L)	23.31 ± 1.07	36.07 ± 3.97**	8-40
ALT (U/L)	24.08 ± 0.84	34.27 ± 3.22**	10-109
BUN (mg/dL)	17.50 ± 1.83	28.52 ± 2.16**	8-28
Creatinine (mg/dL)	0.95 ± 0.13	1.27 ± 0.25*	0.5-1.6

*p < 0.05; **p < 0.01 between group.

might suggest poor nutrition uptake in dogs or may be secondary to parasitic infestation. The reduction in serum protein is attributed to its seepage through damaged capillaries of the villi of intestine, *i.e.,* hypoproteinaemia and hypoalbuminemia in dogs suffered with acute gastritis.

There was high rise in ALT (U/L) and AST (U/L) activity in dogs with vomition (Table 3). Similar results were also recorded by Hendrix (2004), Cooper and Webster (2006) and Suresh (2009). Increased levels of ALT suggests hepatic disturbance secondary to dietary cause. The increase in AST value could be due to dehydration. Elevation in these enzymes may occur as a result of hepatic hypoxia secondary to severe hypovolemia or the absorption of the toxic substance of the gut barrier. The increased mean values of BUN and creatinine in affected dogs concurred with Bhat *et al.* (2015), who recorded similar results showing that there is an increased blood urea nitrogen reflecting pre-renal uremia probably due to reduced glomerular filtration rate because of haemoconcentration in dogs affected with vomition due to gastroenteritis. The present findings are also in accordance with Shah *et al.* (2013), Suresh (2009) and Murali Krishna (2003). The increase in BUN level could be due to dehydration or depleted body fluids leading to decreased renal perfusion resulting in physiological oliguria, which further impairs the excretion of waste products and uremic toxins from the body resulting in high BUN values. Murali Krishna (2003) and Shah *et al.* (2013) reported elevated serum creatinine levels in dogs represented with vomition due to Parvo viral gastroenteritis.

Conclusion

In the present study the haematological examinations revealed that the levels of PCV, TLC and basophils were increased whereas Hb was decreased in dogs showing vomition as compared to healthy control dogs. The mean (± SE) values of serum creatinine, BUN, ALT and AST were significantly elevated with decreased albumin in dogs with vomition as compared to the healthy dogs possibly due to gastroenteritis, hepatic and renal damage or parasitic and dietary origin.

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