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## Haemato-biochemical alterations in colibacillosis affected calves in Wayanad, Kerala

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### Abstract

Colibacillosis is a life-threatening disease in neonatal calves. Severe diarrhoea, dehydration and enterotoxins produced by *Escherichia coli* which is the etiological agent increases the severity of the condition. Seven animals from Instructional Livestock Farm Complex, Pookode kept as control population. Thirty calves with diarrhoea within the age of 28 days from Wayanad district were selected for the study. Faecal sample were cultured in MacConkey agar and EMB agar for to diagnose *E. coli*. All the thirty samples were positive for *E. coli*. Blood samples were collected for haemato-biochemical analysis. Haematology results were such that platelet count was slightly higher in test population in comparison with control population. Erythrocyte count and haemoglobin level were in similar range in between test population and control population. Total WBC count and VPRC were significantly higher in test population than that of control group at one per cent level. Serum biochemistry results revealed that significant decrease in globulin and total protein and significant elevation in urea nitrogen and albumin. But ALT and AST levels were similar between test population and control population.

**Keywords:** Calf, colibacillosis, *E. coli*, diarrhoea, haemato-biochemistry

### Introduction

Colibacillosis causes severe economic damage to livestock industry. Severe diarrhoea and dehydration leads to hypovolemic shock and death of the animal. This condition causes many anomalies in hematobiochemical parameters of affected calves. Asati *et al.* (2008) [1] reported that diarrhoeic calves showed the increased mean value of haemoglobin (Hb), packed cell volume (PCV), total leucocyte count (TLC), and a lower mean value of total erythrocyte count (TEC), eosinophil, monocyte, and basophil per cent. Calves showed lymphocytosis and neutropenia but mean corpuscular volume (MCV) and mean cell haemoglobin (MCH) were increased and decreased mean corpuscular haemoglobin concentration (MCHC) were observed. Singh *et al.* (2014) discovered that there was a significant increase in packed cell volume of colibacillosis affected neonatal calves but there was no significant alteration in haemoglobin. Elevation of PCV, TLC, and TEC has been observed but significant decrease in sodium and glucose were observed in blood analysis of diarrheic calves. But alanine aminotransferase and aspartate aminotransferase had no significant change (Shekhar *et al.*, 2017) [3]. The affected calves showed a higher mean value of Hb, PCV, TLC, and a lower mean value of TEC. There were no significant differences in eosinophil, monocyte, and basophil per centage blood picture of affected calves showed lymphocytosis and neutropenia, whereas MCV and MCH increased and MCHC profiles were decreased during infection (Bleul *et al.*, 2006) [4]. Degree of dehydration and serum urea was positively related and there was also a relationship between base excess and anion gap with a degree of dehydration (Guzelbektes *et al.*, 2007) [5]. Serum biochemistry of diarrheic calves showed an elevation of total protein and globulin but albumin/globulin ratio was decreased. Blood urea nitrogen was increased and serum sodium and potassium were decreased (Asati *et al.*, 2008) [1]. In diarrhoea calves, it was observed that there was a significant elevation in the levels of total serum protein, serum albumin: globulin ratio, serum urea nitrogen, serum albumin, creatinine and potassium and a marked depletion in serum glucose, sodium and chloride but there was no alteration in the levels of serum ALT, AST, and globulin (Singh *et al.*, 2014) [2]. Shekhar *et al.* (2017) [3] analyzed that there is a decrease in serum glucose and no alteration in ALT and AST in diarrhoeic calves.

## Materials and methods

### Test population

Thirty calves with diarrhoea, dehydration and pyrexia within the age of 28 days from Wayanad district were selected for the study as test population

### Control population

Seven animals from Instructional Livestock Farm Complex, Pookode kept as control population

### Sample collection

#### Faecal sample

Faecal samples were collected directly from rectum of diarrheic calves in a sterile collection bottle

**Blood:** Blood (0.5 ml) from jugular vein of calf was taken and blood gas electrolyte analysis was done by epoc® Blood Gas Electrolyte Analysis System and results were recorded. Two ml blood was collected and stored in Vactovein® K3 EDTA (Ethylenediaminetetraacetic acid) vial for complete blood count (CBC) analysis,

**Serum:** Four ml blood was collected for serum biochemistry in Vactovein® Clot activator vial for serum biochemistry analysis.

### Culture

As per manufacturer's instruction, agar powder was reconstituted to double distilled water and sterilized by autoclaving at 15 lbs. pressure (121°C) for 15 minutes and cooled to 45-50°C. Mixed well and then poured in to sterile petri plates.

### Procedure

All samples were first inoculated in MacConkey's agar and

incubated at 37 °C for 24 hours. From the culture, lactose fermenting colonies were stained for gram negative bacteria. The gram-negative colonies were further inoculated in Eosin Methylene Blue media incubated at 37 °C for 24 hours

### Haematology

The collected blood samples were subjected to CBC analysis using Mindray BC-2800Vet auto hematology analyzer (Plate 2). Total WBC count(103/ul), Total erythrocyte count (106/μL), Haemoglobin (g/dL), Platelet count (103/μL) and VPRC (per cent) were recorded.

### Serum biochemistry

Sera were separated from the blood samples and subjected to serum biochemical analysis using Mater T ® Serum Analyser (Plate 3). Total protein (g/dL), Albumin (g/dL), Globulin (g/dL), Urea nitrogen (mg/dL), Alanine Aminotransferase (units/L) and Aspartate Aminotransferase(units/L) were recorded.

## Results

### Culture results

All the two samples were shown lactose fermenting colonies on MacConkey's agar, and in EMB showed purple colonies with black centre and green metallic sheen.

### Haematology results

Platelet count was slightly higher in test population in comparison with control population. Erythrocyte count and haemoglobin level were in similar range in between test population and control population. Total WBC count and VPRC were significantly higher in test population than that of control group at one per cent level ( $p \leq 0.01$ ) (Table 1).

**Table 1:** Haematology results, \*\*= Statistically significant at one per cent level, \*=Statistically significant at five per cent level and ns= Statistically not significant

Parameter	Mean value with standard error		P-value	t-value
	Test	Control		
Total WBC count(103/μl)	14.10 ± 1.58	9.92 ± 0.73	0.001	1.418**
Total erythrocyte Count(106/μl)	9.76 ± 0.41	9.01 ± 0.67	0.281	1.113 ns
Hb(g/dL)	11.37 ± 1.90	11.62 ± 1.7970	0.762	0.309 ns
Platelet(103μl)	683.53 ± 109.88	576.56 ± 157.21	0.87	1.889 ns
VPRC (%)	38.89 ± 0.72	31.17 ± 1.03	0.001	6.099**

### Serum biochemistry results

Mean value of globulin was lower in test population than that of control population and the p-value was 0.002 which was less 0.01 so there exist a significant decrease in globulin. Mean value of Mean value of urea nitrogen was higher in test population comparing with control population and the p-value was 0.001 which was less than 0.01 so there exist a significant elevation in urea nitrogen. Mean value of total protein level was lower in test population than that of control population

and the p-value was 0.022 which is less than 0.05 and greater than 0.01 so there exist a significant elevation at five per cent level. Mean value of albumin level was higher in test population than that of control population and p-value was 0.039 so there exist significant elevation at five per cent level. ALT and AST levels were similar between test population and control population. Mean value of serum analysis with standard error and statistical interpretation are represented in Table 2.

**Table 2:** Serum biochemistry results. \*\*= Statistically significant at 1 per cent level, \*=Statistically significant at 5 per cent level and ns= Statistically not significant

Parameter	Mean value with standard Error		P-value	Inference
	Test	Control		
Total Protein (g/dL)	5.22 ± 0.25	6.92 ± 0.15	0.022	3.197*
Albumin (g/dL)	3.49 ± 0.29	2.96 ± 0.14	0.039	2.159*
Globulin (g/dL)	2.45 ± 0.27	3.24 ± 0.16	0.002	1.368**
Urea Nitrogen (mg/dL)	35.18 ± 1.5	15.64 ± 1.07	0.001	10.582**
ALT (units/L)	20.18 ± 1.44	19.01 ± 2.05	0.646	0.471 ns
AST (units/L)	88.59 ± 2.72	97.35 ± 5.52	0.188	1.424ns

## Discussions

Haematology revealed a marked increase in WBC count and VPRC. Severe dehydration in diarrhoea can lead to hypovolemia which can cause marked elevation in VPRC and leukocytosis was due to bacteremia. The elevation of total WBC count and VPRC in test population are in agreement with Guzelbeketes *et al.* (2007) [5]. They also observed a marked elevation in Total WBC and VPRC levels. There was no significant difference in haemoglobin and total erythrocyte level.

Total protein and globulin were significantly lower in test population than that of control population. This was not in accordance with Guzelbeketes *et al.* (2007) [5]. But urea nitrogen and albumin were significantly higher in test population compared with control population which is in accordance with Guzelbeketes *et al.* (2007) [5].

## Conclusion:

Colibacillosis causes severe economic damage to livestock industry. Severe diarrhoea and dehydration leads to hypovolemic shock and death of the animal. This condition causes many anomalies in hematobiochemical parameters of affected calves. Diagnosis was based on clinical signs such as Diarrhoea, Pyrexia, dehydration etc. Faecal sample culture results were suggestive of *E. coli*. Haematology results were such that platelet count was slightly higher in test population in comparison with control population. Erythrocyte count and haemoglobin level were in similar range in between test population and control population. Total WBC count and VPRC were significantly higher in test population than that of control group at one per cent level. Serum biochemistry results revealed that significant decrease in globulin and total protein and significant elevation in urea nitrogen and albumin. But ALT and AST levels were similar between test population and control population.

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