



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2018; 6(2): 1342-1344

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Received: 14-01-2018

Accepted: 17-02-2018

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Deciphering the biochemical changes of equines affected with acute diarrhea in Odisha

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Abstract

The present study was conducted to develop a suitable therapeutic regimen against the acute diarrhea by evaluating the detail biochemical profile of equines at Teaching Veterinary Complex (TVCC), College of Veterinary Science & AH, Bhubaneswar from time period between December 2016 to October 2017. In this study, the biochemical parameters of ten horse samples affected with acute diarrhea presented to the TVCC were compared with the control group. The biochemical profile was estimated in both treatment and control groups upon biochemical analyzer platform. The results revealed the concentration of glucose (124.57 ± 2.98 mg/dl), AST (352.87 ± 12.56 IU/L), ALP (342 ± 18.63 IU/L), LDH (367 ± 9.98 IU/L) increased more significantly ($p < 0.05$) in the affected horses than the healthy ones, but however there was significantly decrease ($p < 0.05$) in the concentration of total protein (4.48 ± 0.32 g/dl), sodium (115.42 ± 2.71 mmol/l), potassium (2.71 ± 0.23 mmol/l), calcium (8.63 ± 0.21 mg/dl), phosphorus (3.41 ± 0.19 mg/dl), magnesium (1.63 ± 0.09 mg/dl) in the blood of the affected animals than the healthy animals.

Keywords: Acute diarrhea, equine, biochemical profile, biochemical analyzer

1. Introduction

In India, the equine sector contributes major proportion in racing industry which has a great avenue to the state as well as national economy [1]. But now a days, maintaining a constant income sources from the equines is a great challenge as it depends upon the completely health status of the animals. Among lots of diseases, the acute diarrhea is one of important clinical sign in young as well as adult horses which is mainly due to intestinal parasitic infestation [2]. Affected horses typically show signs of depression, reduced appetite and sometimes mild to moderate colic (abdominal pain), often before the onset of diarrhea [3]. Typically there is substantial inflammation of the large intestine (specifically large colon and caecum) and loss of large volumes of fluid (up to 100 litres) characterized by disturbances in the intestinal micro flora, gastro-intestinal motility, acid-base imbalance, electrolyte imbalance, and dehydration ultimately shock and death [4]. So to prevent the life as well as economical loss in quick time, an appropriate therapeutic regimen must be developed but, which requires a thorough investigation of biochemical status in the animal [5]. Keeping the present view in mind, the biochemical analysis of the affected and the normal animals will give an idea not only for treatment but acts a marker for the disease prognosis. This study would provide a better platform to the field veterinarian for development a suitable therapeutics against acute diarrhea in equines.

2. Materials and Methods

The present study was carried out by taking the clinical history of the equine samples presented to the Teaching Veterinary Complex (TVCC), College of Veterinary Science & AH, Bhubaneswar from time period between December 2016 to October 2017 making them into two groups. Ten (10) apparently healthy animals were taken as control group [Group I] but the treatment group [Group II] was made by considering ten horses with preliminary clinical history of increased water content in the faeces and increased frequency of defecation. Serum was separated from all the sample by centrifuging at 3000RPM for 10 minutes in centrifuge; separated aliquots were made for each vial and stored at -20 °C deep freezer for further analysis. The biochemical parameters like Glucose, Total protein (TP), Blood Urea Nitrogen (BUN), serum creatinine, Aspartate amino transferase (AST), Alkaline phosphatase (ALP), Lactate dehydrogenase (LDH), γ -Glutamyl transferase (GGT), calcium(Ca),

phosphorus (P), magnesium (Mg) were analyzed with method [6] on fully automatic biochemical analyzer [Turbo Chem-100, CPC Diagnostics, USA] using I-chem biochemical kits [Jeev diagnostics] at Dept. of Vety. Biochemistry, CVSc & AH, OUAT. Before the analysis, the instrument was properly calibrated with standard calibrator [Biorad level I] and normal control [Randox]. Sodium (Na) and potassium (K) from each serum samples were measured by flame photometer [CL410, Chemiline] using series of standard solution of a particular analyte with method [7].

3. Statistical Analysis

The data collected from this study were analyzed upon statistical software programme SPSS using method of Snedecor [8].

4. Results and Discussions

The result of the biochemical profile of the present study is shown in Table No. I.

Table I: Comparison of biochemical parameters of healthy and affected horses

Parameters	Group I (Healthy horses)	Group II (Affected horses)
Glucose (mg/dl)	91.84±2.61	124.57*±2.98
Total Protein (g/dl)	6.59±0.17	4.48*±0.32
BUN(mg/dl)	29.12±2.15	41.23*±3.41
Creatinine (mg/dl)	1.17±0.07	1.76*±0.03
Sodium (mmol/l)	137.78±0.48	115.42*±2.71
Potassium (mmol/l)	4.61±0.51	2.71*±0.23
Calcium (mg/dl)	12.14±0.14	8.63*±0.21
Phosphorus (mg/dl)	5.3±0.06	3.41*±0.19
Magnesium (mg/dl)	2.41±0.04	1.63*±0.09
AST (IU/L)	291.38±3.98	352.87*±12.56
ALP(IU/L)	269.54±7.84	342*±18.63
LDH(IU/L)	249.78±5.12	367*±9.98
GGT(IU/L)	8.63±0.59	27.23*±2.94

This study showed that there was significant increase ($p<0.05$) in glucose concentration in the affected horses which is in accordance with the findings of Bertin *et al* [9]. It may be due to high release of glucagon, epinephrine, cortisol, and growth hormone in the body of affected horses which may oppose the normal actions of insulin and promote the gluconeogenesis [10]. Moreover, the hyperglycemia may be due to proinflammatory cytokines released due to inflammation [11].

There was significant ($p<0.05$) decrease trend in the protein concentration of the affected horses than the control group which may be due to proteolysis [12], protein losing enteritis leading to haemoconcentration which is a good agreement with the findings of Alberghina *et al* [13]. The excessive loss of protein through the faeces may be the major cause for decrease in protein concentration in blood due to enterotoxigenic *E. coli* infection [14].

There was significant increase ($p<0.05$) in the BUN concentration (41.23±3.41mg/dl) and serum creatinine level (1.76±0.03mg/dl) in the affected animals, found in this present study. This may be due to excess water loss through the faeces which is similar to the finding of Thoenes *et al* [15]. The BUN and creatinine level may be higher than normal value due to acute renal failure that is occurred by microorganism in acute diarrhoea affected horses [16].

This present study showed a significant decrease ($p<0.05$) in the mean value of sodium, potassium, calcium, phosphorus and magnesium of the affected animal than the healthy

animals which is in similar accordance of the finding of [17]. This result is due to huge water and electrolytes loss through faeces in the acute diarrhoea affected animal [18]. The alteration in these electrolyte balance may be due to metabolic acidosis developed in acute diarrhoea affected horses [19].

It was found that the affected animals showed a significant increase ($p<0.05$) in AST, ALP, GGT and LDH enzymes concentration in the blood than the healthy animals. This may be due to intestinal inflammation which leads to weight loss and ultimately damage of hepatic tissue causing release of intracellular liver specific enzymes to outside [20]. All the liver specific enzymes in serum of affected horses may be increase due to toxins that causes membrane rupture in the hepatic cells [21].

5. Conclusion

From this present study, we can conclude that the mean value of glucose, BUN, creatinine, AST, ALP, GGT, and LDH may be increased, and the total protein, sodium, potassium, calcium, phosphorus and magnesium values may be decreased in the affected animals than the healthy one. So this study would provide a suitable platform for the field veterinarian to provide an effective clinical management to alleviate acute diarrhoea condition in equines.

6. Acknowledgement

Authors are thankful to the Dean, College of Veterinary Science and Animal Husbandry, OUAT, Odisha, India, for providing the necessary facilities to undertake this study.

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