



## THERAPEUTIC MANAGEMENT OF EQUINES SUFFERING FROM ACUTE DIARRHOEA AND DETERMINATION OF ANTIBIOGRAM PATTERN OF *E. coli* ISOLATES

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### ABSTRACT

Acute diarrhoea is a clinical sign of large intestinal disease in adult horses. The present study was conducted on 12 cases of equines suffering from acute diarrhoea presented to Veterinary Clinical Complex (VCC), LUVAS, Hisar. Cases were from the age group of 3 to 10 years. Duration of illness ranged from one to three days. All the animals were dull and depressed and passing watery faeces. All cases were negative for parasitic ova or oocysts. Vital clinical parameters (respiration rate, heart rate and rectal temperature) were observed. Faecal swab from the rectum of the affected animals were subjected to bacterial isolation and drug sensitivity testing. Cases were treated with specifically designed therapeutic trial i.e. Ceftriaxone @ 7.5 mg/kg BW IM od x 5 days, Metronidazole @ 20 mg/kg BW IV od x 5 days, Lugol's Iodine @ 15 ml in 500 ml of NS slow IV od x 5 days, polyherbal NSAID Rumalya® @ 2 PO bid x 5 days, Ascorbic acid @ 7.5 g IM od x 5 days, Sodium bicarbonate @ 20g PO od x 1 day, polyherbal antidiarrhoeal preparation (Diaroak®) @ 30 g PO od x 3 days, Yeast (Latifur™) @ 10 g PO bid x 10 days, Fluid therapy (Ringer's Lactate) 10L IV od x 5 days. Significant decrease ( $p < 0.05$ ) was observed in the values of rectal temperature, heart rate and respiration rate. Bacterial culture test of the faecal swabs revealed that *E. coli* was present in all the cases and was most sensitive to antibiotics like Ceftriaxone (100%), Ciprofloxacin (100%), Norfloxacin (100%), Gentamicin (83%) and Amikacin (83%) while it was least sensitive to antibiotic like Cefotaxime (33%). Success rate in this therapeutic trial study was 83%. In conclusion, Ceftriaxone along with metronidazole and Lugol's Iodine may be used in a therapeutic management of equines suffering with acute diarrhoea and regular surveillance of antibiotic sensitivity against the microorganisms which causes diarrhoea should be done to adopt control programme.

**KEY WORDS:** Equines, Acute Diarrhoea, Ceftriaxone, Lugol's Iodine, *E. coli*, antibiotic sensitivity

### INTRODUCTION

Diarrhoea is defined as increased fluid content in the faeces compared with homeostasis. Acute diarrhoea in adult horses is a clinical sign of large intestinal disease. Other signs include colic, dullness, dehydration and endotoxemia, which can progress to shock and death. Most common causes of diarrhoea are disturbances in microflora of colon resulting in pathogen overgrowth and gastrointestinal motility alterations as well as loss of intestinal fluid, electrolyte and acid-base imbalances. Diarrhoea in adult horses can be very frustrating for the veterinarian because most of the time exact diagnosis could not be made. If disease is because of any inflammatory condition, prognosis of the case is guarded (McGovern, 2013). In general, choice of antibiotics is based upon experience but knowledge of latest trends in bacterial populations and the development of resistant bacteria are essential to the equine practitioner (Bowen and Clegg, 2015). Other inflammatory diseases of the equine gastrointestinal tract are also an important cause of morbidity and mortality in horses (Feary and Hassel, 2006). Therefore keeping in view the present study was designed with following objectives: 1. To do therapeutic management of equines suffering from acute diarrhoea,

2. To determine antibiogram pattern against *E. coli* isolates which were isolated from faeces of diarrhoeic horses

### MATERIALS & METHODS

The present investigation was carried out on clinical cases of diarrhoea in equines ( $n=12$ ) brought to Veterinary Clinical Complex (VCC), LUVAS, Hisar. Other than these 12 clinical cases, six animals were taken as healthy control. History of affected animals with regard to age, duration of illness, defecation and duration of anorexia or inappetence was obtained from the animal owners. Complete clinical examination of the suspected animals was made which included recording of rectal temperature ( $^{\circ}\text{F}$ ), heart rate, respiration rate, mucus membrane status etc. Faecal samples ( $n=12$ ) were collected per-rectally for bacterial isolation and drug sensitivity testing. Individual faecal swabs were placed overnight in buffered peptone water (BPW) at  $37^{\circ}\text{C}$  and then cultivated for *E. coli*. Culture in buffered peptone water was streaked onto MacConkey's agar (MAC) plates and incubated for 18-24 hours at  $37^{\circ}\text{C}$ . Lactose fermenting colonies were picked and identified by gram stain, and standard biochemical tests, viz., catalase, oxidase, fermentation of lactose and glucose using triple sugar iron agar, production of indole,

methyl red test, voges proskauer test, urease test and utilization of citrate were performed (Edwards *et al.*, 1972). All the *E. coli* isolates were also tested for susceptibility to 14 antibiotics *viz.* Amikacin (10 mcg), Ampicillin (25 mcg), Amoxycylav (30 mcg), Ceftriaxone (10 mcg), Chloramphenicol (10 mcg), Cefotaxime (30 mcg), Ciprofloxacin (30 mcg), Cefoperazone (30 mcg), Norfloxacin (5 mcg), Oxytetracycline (30 mcg), Gentamicin (50 mcg), Streptomycin (10 mcg), Enrofloxacin (10 mcg) and Erythromycin (10 mcg) as previously described (Literak *et al.*, 2007). The results were interpreted on the basis of inhibition zone as per the manufacturer's recommendations (Hi-Media, Mumbai) after 24 hours of incubation at 37°C.

#### Therapeutic trial

Animals affected with diarrhoea were administered Ceftriaxone @ 7.5 mg/kg BW IM od x 5 days, Metronidazole @ 20 mg/kg BW IV od x 5 days, Lugol's Iodine @ 15 ml in 500 ml of NS slow IV od x 5 days (Bafort *et al.*, 2014), polyherbal NSAID (Rumalya® M/s Himalaya Drug) @ 2 PO bid x 5 days, Ascorbic acid @ 7.5 g IM od x 5 days, Sodium bicarbonate @ 20g PO od x 1 day, polyherbal anti diarrhoeal preparation (Diaroak® M/s Ayurved) @ 30 g PO od x3 days, Yeast (Latifur™ M/s Carus Industries) @ 10 g PO bid x 10 days, Fluid therapy (Ringer's Lactate) 10L IV od x 5 days. The post treatment parameters were determined after five days from the start of the treatment. Results were interpreted by improvement in clinical findings and follow up was done for 30 days to judge the cure rate.

#### Statistical method

Data was analysed by Duncan test for multiple comparisons using computer software SPSS 16.0.

## RESULTS & DISCUSSION

Mean age of animals affected with diarrhoea was  $5.7 \pm 0.6$  years with range from three to ten years. Duration of illness was from one to three days with mean value of  $1.9 \pm 0.2$  days. All the cases were in acute stage. All cases were dull and depressed. Two third of the horses were anorectic and rest were having reduced appetite. McGovern (2013) also reported that horses with acute diarrhoea are dull and endotoxic while horses with chronic diarrhoea are bright and with good appetite. Vital clinical parameters of all the animals are presented in table 1. Mean temperature of affected animals before treatment was  $101.1 \pm 0.5^\circ\text{F}$ , significantly higher ( $p < 0.05$ ) than the mean value of healthy animals ( $99.1 \pm 0.1^\circ\text{F}$ ) and post-treatment value of affected animals ( $100.0 \pm 0.1^\circ\text{F}$ ). Similar findings were reported by (Pratt *et al.*, 2003; Radostits *et al.*, 2007; Gomez *et al.*, 2013; Singh *et al.*, 2015). Mean respiration rate of affected animals before treatment was  $16.1 \pm 1.1$  breaths per minute significantly higher ( $p < 0.05$ ) than the mean value of healthy animals ( $10.8 \pm 0.5$ ) and post-treatment value of affected animals ( $10.5 \pm 0.3$ ). Similar findings were reported by (Pratt *et al.*, 2003; Radostits *et al.*, 2007; Gomez *et al.*, 2013; Singh *et al.*, 2015). Mean value of heart rate of affected animals before treatment was  $48.3 \pm 1.5$  beats per minute significantly higher ( $p < 0.05$ ) than the mean value of healthy animals ( $35.3 \pm 0.9$ ) and post-treatment value of affected animals ( $35.1 \pm 0.7$ ). Similar findings were reported by (Stewart *et al.*, 1995; Pratt *et al.*, 2003; Radostits *et al.*, 2007; Gomez *et al.*, 2013; Singh *et al.*, 2015). In another study, Stewart *et al.* (1995) further associated increased values of heart rate and respiration rate with non survivability of horses. After five days of treatment all these values moved towards the values of healthy control animals.

**TABLE 1:** Vital clinical parameters in equines affected with diarrhoea compared to healthy control (Mean  $\pm$  S.E.)

Variable	Healthy Control group (n=6)	Pre-treatment (n=12)	Post-treatment (n=12)
Temperature ( $^\circ\text{F}$ )	$99.9^b \pm 0.1$ (99.5-100.4)	$101.1^a \pm 0.5$ (96.8-102.8)	$100.0^b \pm 0.1$ (99.4-100.7)
Respiration rate (breaths/min)	$10.8^b \pm 0.5$ (9-13)	$16.1^a \pm 1.1$ (7-20)	$10.5^b \pm 0.3$ (9-12)
Heart rate (beats/min)	$35.3^b \pm 0.9$ (31-38)	$48.3^a \pm 1.5$ (42-60)	$35.1^b \pm 0.7$ (31-39)

Note: means bearing different superscripts in a row differ significantly ( $p < 0.05$ ).

Figures in parenthesis indicate range of the parameter.

Pyrexia, tachypnea, and tachycardia may be due to systemic inflammatory response syndrome. Systemic inflammatory response syndrome (SIRS) happens after an infectious or non infectious condition causing severe systemic inflammation. This can be due to burn injury, trauma or bacterial products, including lipopolysaccharides (LPS), which are absorbed across the intestinal wall into the systemic circulation and lead to an exaggerated, uncontrolled immune response. The increased response of the immune system and other events that follow it significantly contribute to the development of the symptoms such as tachycardia, fever, reduced intestinal motility, abdominal pain and diarrhoea (Sykes and Furr, 2005).

#### Bacterial Culture Examination

In the present study, all the faecal swabs were found positive for *E. coli* and were confirmed by gram's staining and biochemical tests. Although *E. coli* is normal inhabitant of gastrointestinal tract of horses, but presence of these *E. coli* isolates from faecal samples of horses which were affecting from diarrhoea was an indication of its pathogenic nature, so further serotyping is needed to confirm its pathogenic nature. Similarly, Ahmed *et al.* (2010) and Bryan *et al.* (2010) also isolated *E. coli* organisms from the faeces of horses.

#### Culture Sensitivity Test

On the basis of inhibition zone it was found that *E. coli* isolates were most sensitive to antibiotics Ceftriaxone,

Ciprofloxacin, Norfloxacin and Oxytetracycline being sensitive in 100 % cases followed by Gentamicin and Amikacin found sensitive in 83 % cases. Cefoparazone, Ampicillin, Amoxyclav and Chloramphenicol were sensitive in 67 % cases while Streptomycin, Enrofloxacin and Erythromycin were sensitive in only 50% cases. Cefotaxime were found least effective being sensitive only in 33% cases. Bryan *et al.* (2010) reported that *E. coli* isolated from the faeces of the horses suffering from diarrhoea was most sensitive against Chloramphenicol and colistin. Maddox *et al.* (2011) reported that the overall prevalence of antimicrobial-resistant *E. coli* in horse faecal samples identified in this study was high (70.2%). Johns *et al.* (2012) reported that antimicrobial administration to horses in hospital is associated with an increased risk of faecal shedding of antimicrobial resistant *E. coli*, but that the risk is transient, returning to pre-treatment levels within two months of antimicrobial discontinuation.

#### Therapeutic trial

Therapeutic regimen including Ceftriaxone, Metronidazole, Lugol's Iodine (Bafort *et al.*, 2014), Rumalya, Ascorbic acid, Sodium bicarbonate, Diaroak, Latifur and Fluid therapy (Ringer's Lactate) administered in cases of life threatening diarrhoea in equines resulted in complete recovery in 10 out of 12 cases (83%). A poly herbal preparation was used as NSAID to avoid the possibility of development of dysentery when COX inhibitors are used. Ascorbic acid was used to counter the oxidative stress induced by the action of Lugol's Iodine (Bafort *et al.*, 2014) in the process of microbial killing.

In conclusion, Ceftriaxone along with metronidazole and Lugol's Iodine may be used in a therapeutic management of equines suffering with acute diarrhoea and regular surveillance of antibiotic sensitivity against the microorganisms which causes diarrhoea should be done to adopt control programme.

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