

COMPARATIVE EFFICACY BETWEEN CIPROFLOXACIN AND GENTAMYCIN IN NEONATAL CALVES IN BANGLADESH

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ABSTRACT. Diarrhoea in calves is considering a serious clinical problem in Bangladesh. Calf is the back bone of the dairy industry. Diarrhoea in farm animals, especially in neonatal calves is one of the most challenging clinical syndromes encountered by large animal Veterinary practitioners. The present investigation was conducted with the aimed to evaluate the efficacy of ciprofloxacin and gentamycin in the treatment of diarrhoea in neonatal calves. The studied was carried out for a period of six month from January 2013 to June 2013 in Kanaighat, Sylhet, Bangladesh. Calves (n=60) under 10 days of age with clinical signs of diarrhoea were randomly divided into two groups. One group was treated with intramuscular ciprofloxacin at a dose of 5 mg/kg once daily, while other group was treated with intramuscular (IM) gentamycin (dose of 5 mg/kg) once daily for three consecutive days. Calves evaluated clinically from the treatment and the recovery rates for the

ciprofloxacin and gentamycin groups after three days of treatment were 73.33% and 66.67%, respectively. This trial revealed ciprofloxacin administered through IM route from the first day of the clinical sign observed was more efficacious in calf diarrhoea compared to gentamycin.

Keywords: Diarrhoea, Neonatal calves, Age, Ciprofloxacin, Gentamycin, Bangladesh

INTRODUCTION

Calf diarrhoea is a multi-factorial disease that can lead to serious consequences on economical and animal welfare of commercial dairy farms in Bangladesh. Diarrhoea is the most common disease reported in calves aged up to 3 months old (Vandeputte and Gannon, 2010) and it has been estimated that 50% of the neonatal mortality in commercial dairy herds is caused by acute diarrhoea (USDA, 2002). In Bangladesh, antimicrobial agents such

Ampicillin, Amoxicillin, Sulfonamides, are frequently used for the treatment of uncomplicated and undifferentiated diarrhoea in calves. It was reported also in US farmers, veterinarians and producers have relied on over-the-counter and prescription uses of antimicrobials agent as part of treatment protocols for cases of calf diarrhoea (USDA-APHIS, 2008). Routine uses of parenteral antibiotics are commonly recommended in diarrheic calves. Ciprofloxacin and gentamycin were frequently used in calf diarrhoea in Bangladesh. The efficacy of each antibiotic varies with the route of administration and whether the antimicrobial is dissolved in milk, oral electrolyte solutions or water (Morley *et al.*, 2005). Due to limitation in facilities and technical knowhow, antibiotic efficacy (%) study on the treatment protocol is still limited in Bangladesh. Therefore, the current field study was undertaken to

determine the efficacy (%) of parenteral administration of ciprofloxacin and gentamycin in the treatment of diarrhoea. The chronicled outcomes of the treatment in animals during the study were score and recorded. The clinical sign such faecal, dehydration, body temperature, inappetence and suckling reflex for the first 10 days following birth were criteria for monitoring the effectiveness of the treatment.

MATERIALS AND METHODS

Site profile and geographical information: The study was conducted for a period of six month starting from January 2013 to June 2013 in Kanaighat Upazila (sub-district), Sylhet, Bangladesh (24°53' - 25°06'N, 92°01' - 92°26'E) (Figure 1). The area is bounded by Meghalaya state of India and Jaintiapur Upazila,



Figure 1. Geographical location of the study area Kanaighat, Sylhet, Bangladesh (Banglapedia, 2013).

Bangladesh on the north, Beanibazar and Zakiganj Upazila, Bangladesh on the south, Maghalaya state of India on the east, Golapganj and Jaintiapur Upazila, Bangladesh on the west (Banglapedia, 2013).

Animal details: A total sixty (60) cross breed calves from eleven (11) selected farms in study site were selected for the experiment. Among the selected calves, 30 were male and another 30 were female, aged between 1 to 10 days (4.6 ± 2.8 days) and body weights between 24 – 64 kg (45.2 ± 7.5 kg). Calves were enrolled in this study were selected based on clinical signs, texture of faecal, dehydration, body temperature, inappetence and suckling reflex with diarrhoea, using the clinical scoring system (Table 1).

Clinical scoring and disease assessment:

Clinical scoring was performed based on six clinically criteria (Table 1), which were recorded individually and summed to the total score. Clinical scoring and disease assessment were conducted at the beginning of the study for animals selection and it was continued 3 days after treatment as part of evaluation of the treatment response. The clinical examination was conducted by the researcher and the veterinarian from the Upazila Veterinary Hospital, Kanaighat, Sylhet. The antimicrobial efficacy was evaluated based on the recovery of clinical signs at day 3 after treatment.

Treatment protocol: Due to ethical reasons, an untreated control group in this study was considered inappropriate. Therefore, all selected calves were randomly divided into two treatment groups; 30 calves were treated with ciprofloxacin and another 30 calves were treated with gentamycin. The two treatment

Table 1. Clinical scoring of the criteria for Diarrheic calf used in the study

Clinical sign	Criteria	Score
Nature of faeces	Normal consistency	0
	Semi formed or pasty	1
	Loose but enough consistency to remain on bedding	2
	Watery faeces that sift through bedding material	3
Dehydration	Skin fold tented for 1 sec	0
	Skin fold tented for up 4 sec (5%)	1
	Skin fold tented for 4 to 8 sec (5 – 10%)	2
	Skin fold tented for more than 8 sec (>10%)	3
Inappetence	Normal	0
	Slightly decreased (<50%)	1
	Decreased (>50%)	2
	Anorexic	3
Suckling reflex	Present	0
	Absent	3

groups were homogenous for sex, age, bodyweight, and breed at inclusion. Ciprosol® containing ciprofloxacin was administered at a dose of 0.1 ml per 20kg body weight (5.0 mg/kg ciprofloxacin), was given once daily for 3 consecutive days. Gentavet® containing gentamycin was administered at a dose of 0.1 ml per kg body weight (5.0 mg/kg gentamycin), and given 3 times daily for 3 consecutive days. Both antibiotics were administered intramuscularly (IM) in the hip region of the calves. Each calf was given 1 litre of fluids (Electrolytes) intravenously during the daily treatment to rehydrate the calves. The calves were also given oral fluids (Electrolytes) at *add libitum*. Any calf that requires other or further treatments was classed as treatment failures and removed from the study.

Evaluation of antibiotic response:

Evaluations the effectiveness of drugs has been measured by reversal activity of the clinical signs within 3 day of the treatment. Calves were defined as recovered if on day 3 after treatment rectal temperature were lower than 39.5 °C and not more than one clinical sign as described above (Table 1). Treatment were defined fail if rectal temperature were at 39.5 °C or above and more than one clinical signs still shown on day 3 and required further treatment for recovery from diarrhoea or died during study period.

Statistical Data analysis: One-way analysis of variance (ANOVA) was conducted by SPSS 12 (Chicago, USA) to

detect the significance differences among the treatments and values were considered significant at $p \leq 0.05$.

RESULTS AND DISCUSSION

At inclusion, 45% (27 of 60) of the calves were pyrexia. 90 % (54 of 60) had liquid faeces (indicating a moderate to marked diarrhoea), 83 % (50 of 60) were dehydrated, all calves had reduced appetite with 40% (24 of 60) showing anorexia, and 54% (32 of 60) had no sucking reflex.

Clinical efficacy or recovery rate (%) of ciprofloxacin and gentamycin for diarrhoea was recorded as 73.33% and 66.67%, respectively (Table 2 & Figure 2). However, efficacy (%) of ciprofloxacin was 80 and 66.66 in male and female. While for gentamycin it was 73.33 and 60.00 in male and female respectively (Figure 3 & 4). Since mortality rate of calf due to diarrhoea is high during their early age, detection of early clinical signs followed by appropriate intervention is crucial. This finding have correlation with Lofstedt *et al.*, (1999) who stated that diarrhoea in calves is high in early age, calves with diarrhoea and severe systemic illness involvement, antimicrobial therapy must be pondered carefully and subject to early treatment (Sheila, 2008). Routine use of injectable antibiotic should be recommended in calves with systemic illness. Present study followed the protocol recommended by Sheila (2008). In her study, she also define the successful of the 3 days treatment when the animals shows reversal of clinical signs, bright attitude

and faeces stay normal in nature (score 0 or 1).

The selection of antibiotic for treatment should be based on the sensitivity of the bacterial. This is to prevent the occurrence of bacteria resistance to antimicrobial. Constable (2004) notes that several antimicrobial agents are recommended for diarrhoeal disease in

calves and few have been subjected to clinical trials. Present findings coincided with Constable (2004) who stated that Fluoroquinolones group clearly have proven efficacy in treating calf diarrhoea, and is available to use as treatment for calf diarrhoea in Bangladesh. The association between the delayed appearances of clinical signs for treatment from the first

Table 2. Recovery rate of Ciprofloxacin and Gentamycin for the Treatment of Diarrhoea in Calves.

Antibiotic type	Total calves	Treated		Recovery (%)		Recovery (%)
		Male	Female	Male	Female	
Ciprofloxacin	30	15	15	12 (80)	10 (66.66)	22 (73.33)
Gentamycin	30	15	15	11 (73.33)	9 (60)	20 (66.67)

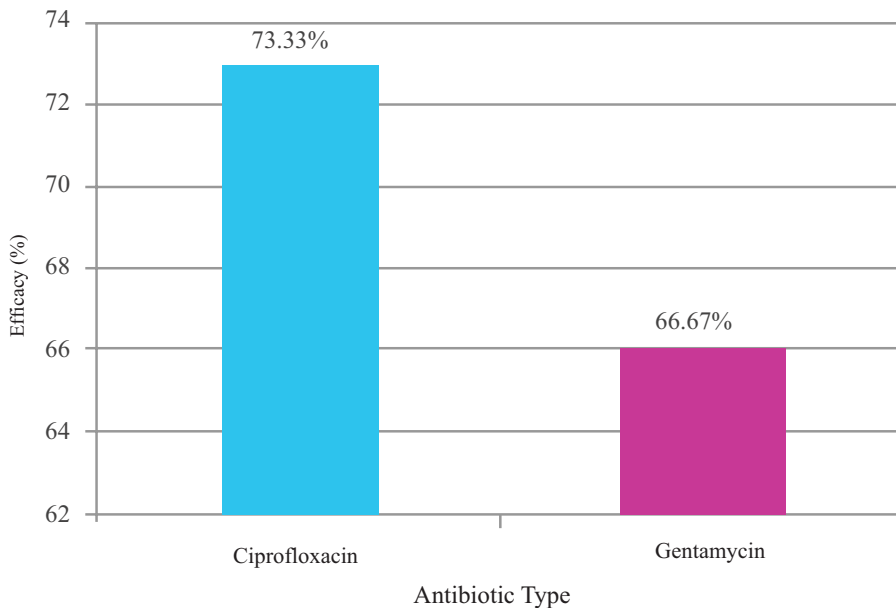


Figure 2. Comparative efficacy (%) of Ciprofloxacin and Gentamycin for the Treatment of Diarrhoea in Calves.

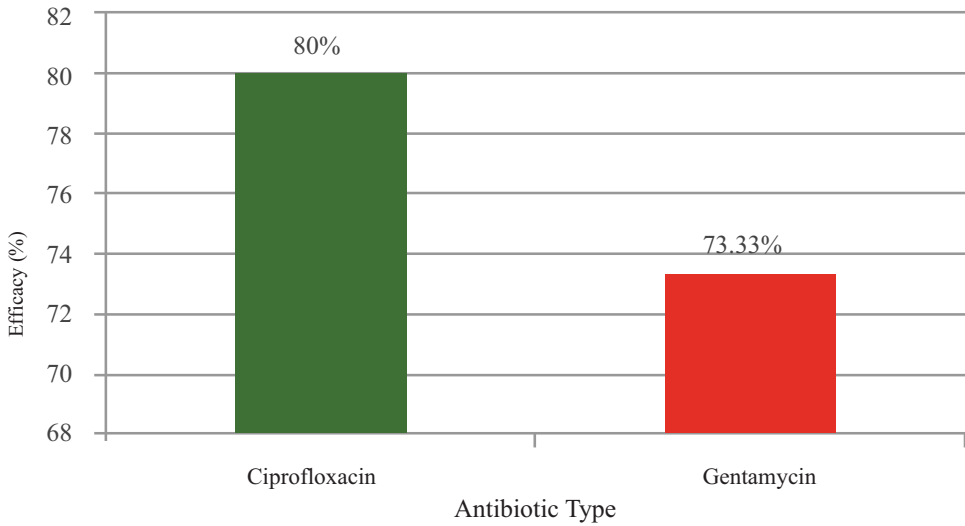


Figure 3. Comparative efficacy (%) of Ciprofloxacin and Gentamycin for the Treatment of Diarrhoea in Male Calves.

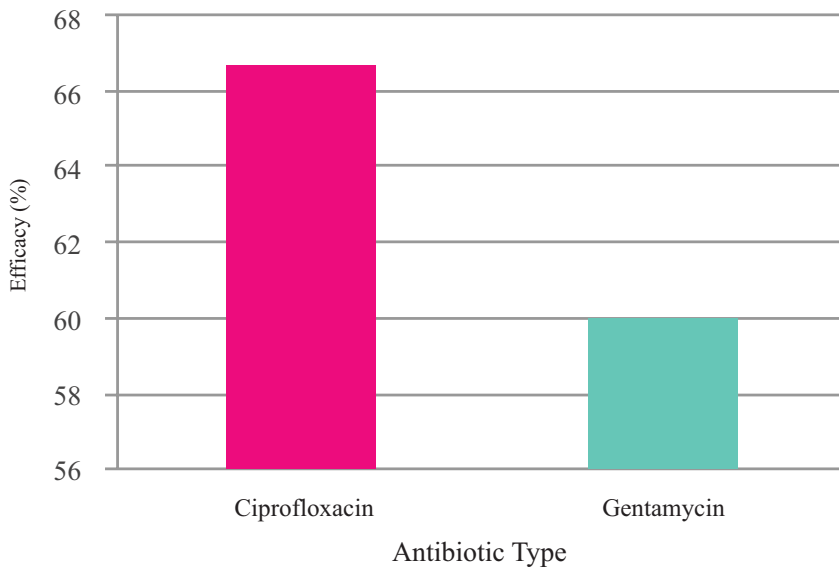


Figure 4. Comparative efficacy (%) of Ciprofloxacin and Gentamycin for the Treatment of Diarrhoea in Female Calves.

day is unexplained and therefore, further investigations are required to establish this association.

Present result suggested that treatment after appearance of clinical signs of diarrhoea induce the faster rate of recovery compared to delayed treatment. Moreover, Hudson and White (1982) stated that proper clinical diagnosis and early treatment will decrease the threat and outbreak of diarrhoea in calves. When antibiotic was given within the first 10 hours, it produces desirable effect. However, antibiotics given after 2-3 days appear to be less effective. Present results determine the correlation coefficient of administered antibiotics with the treatment, recovery and efficacy (%). The overall administered antibiotics have significant effect in recovery ($p < 0.05$) and efficacy percentage ($p < 0.05$). This data indicates that treatment with ciprofloxacin and gentamycin is an effective way to overcome calf diarrhoea in Bangladesh perspective where other available antibiotics (Ampicillin, Amoxycillin, Sulfonamides)

are not found in village area. The mean rectal temperature of the calves did not significantly change over the course of the study ($p > 0.05$). In Bangladesh, calf diarrhoea remains the most often reported clinical problem in calf management and rearing system (Debnath, *et al.*, 1987). Present results suggest that treatment of calf diarrhoea with ciprofloxacin exhibits higher efficacies (%) compare to the gentamycin.

CONCLUSION

This trial discloses that ciprofloxacin administered through intramuscular route was found to be more efficacious in treatments of calf diarrhoea compared to gentamycin. Based on the present results, treatment with ciprofloxacin through IM route for 3 days from the first day of clinical signs observed is recommended for calf diarrhoea in Bangladesh.

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