

ACUTE BACTERIAL ENTERITIS IN PUPS AND IT'S TREATMENT

S. Chanda, N. R. Pradhan and C. Lodh

Department of Veterinary Medicine Ethics and Jurisprudence, Faculty of Veterinary and Animal Sciences,
West Bengal University of Animal and Fishery Sciences, Kolkata.

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Gastroenteritis is very common in young pups due to variety of causes including viral or bacterial infections. Viral infections are protected by vaccinations, but bacterial infections cause moderate to severe diarrhoea and vomition leading to severe electrolytic loss. The pups become very weak, emaciated and ultimately die, which requires proper and effective treatment. In this study an effective treatment for bacterial enteritis has been suggested.

Materials and Methods

For the study, 24 young pups of descriptive and non-descriptive breeds of both sexes, 1 to 6 months age and body weight between 2 to 10 kg suffering with moderate to severe diarrhoea and vomition etc. were selected from the pups presented in the Teaching Veterinary Clinical Complex under WBUAFS, Kolkata.

These pups were divided in four groups comprising 6 each as Group II, Group III, Group IV and Group V. Another 6 pups brought for vaccinations were healthy and kept in Group I (control).

Rectal swabs of these pups were aseptically collected and transferred to the laboratory for isolation and identification of the bacteria (Merchant and Parker, 1967). The samples were finally cultured in Eosin Methylene Blue (EMB) agar, Brilliant Green agar (BGA) and Xylose Lysine Deoxycholate (XLD) agar. Biochemical characterizations were done by Indole, MR, VP, Citrate utilization and Nitrate reduction tests and also by Sugar Fermentation test.

The sensitivity test was carried out by single disc diffusion technique (Eliner, 1978)

and accordingly treatments were given. Blood samples were collected for different haematological studies (Brar *et al.* 2000) on 0, 2nd, 4th, 7th, 10th and 15th days.

The Gr. II diarrhoeic pups were kept as untreated control while the Gr.III pups were treated with tab. Norflox TZ, a product containing Norfloxacin and Tinidazole @ ¼ to ½ tab twice daily orally for 5 days. The Gr.IV pups were treated with syr. Oflokind OZ-pet, a product containing Ofloxacin and Ornidazole @ ½ to 1tsf twice daily orally for 5 days while Gr.V pups were given Diaroff powder containing whey powder, vitamins, minerals and probiotics etc. @ 1 tsf twice daily orally for 5 days along with Oflokind OZ-pet. Pups of these three groups were also treated with T-Cef XP, a product containing Ceftriaxone and Tazobactam (250mg, 31.25 mg) ½ to 1 vial once daily for 5 days.

Besides, these pups were also given with the supportive therapies like Ringer's Lactate I/V twice daily, Ranitidine and Ondansetron I/M twice daily for controlling dehydration and vomition for 3 to 4 days as per the recommended doses.

Results and Discussion

The healthy pups of Gr.I were very active, good physical condition and had normal appetite, but the pups of Gr.II, III, IV and V showed weakness, moderate to severe diarrhoea, vomition, dehydration and anorexia etc. The pups of Gr.II which were not treated, showed gradual deterioration of health showing marked dehydration, ataxia, severe depression and coma etc. Two of them died on 4th and 6th days of the experiment while the treated pups of Gr.III, IV and V

showed gradual improvements of the clinical signs, corroborated with Ghosh (2006). Out of 24 faecal samples collected from those clinical cases, *E.coli* was isolated from 20 samples (83.33%) and *Salmonella spp.* from 4 samples (16.67%).

The EMB agar after 24 hrs of incubation, showed smooth, dark and blue black colonies with metallic green sheen of *E.coli* while the Brilliant green agar showed the red-pink-white opaque coloured colonies of *Salmonella spp.* After incubation on the XLD agar for 24 hrs with *Salmonella spp.*, it showed red colonies with some black centres. The agar itself also turned red due to the presence of salmonella colonies.

The biochemical tests for *E.coli* showed positive reactions to Indole, Methyl red, and Nitrate reduction and negative to VP and Citrate utilisation while the sugar

fermentation tests showed positive to Glucose, Lactose, Salicin and Dulcitol and negative to Maltose, Mannitol, Adonitol and Inositol. Similarly the *Salmonella spp.* showed positive reactions to Citrate utilisation, Indole, Glucose, Maltose and Dulcitol and negative to MR, VP, Lactose, Sucrose and Salicin.

The antibiogram of the isolated *E.coli* showed highly sensitive to Ofloxacin, Ciprofloxacin, Cefotaxim, Ceftriaxone and Ceftriaxone with Tazobactam agreeing with Singh (2001). Similarly, the isolated *Salmonella spp.*, was found highly sensitive to Ofloxacin, Norfloxacin, Ciprofloxacin, Ceftriaxone and Ceftriaxone with Tazobactam as also observed by Kumar and Soman (2001).

Table 1: Haematological values in different groups of pups before and after treatment

Parameter	Group	0 day	2 nd day	4 th day	7 th day	10 th Day	15 th day
Hb (gm/dl)	I	13.52 ±0.91	13.53 ±0.89	13.42 ±0.90	13.40 ±0.88	13.37 ±0.89	13.32 ±1.02
	II	13.20 ±1.03	13.21 ±0.88	12.63 ±1.03	12.70 ±0.91	12.39 ±0.91	13.10 ±0.97
	III	13.30 ±0.91	13.60 ±1.00	13.61 ±1.02	13.52 ±1.07	13.68 ±1.02	13.45 ±1.02
	IV	13.40 ±0.91	13.60 ±1.02	13.32 ±0.92	12.53 ±1.02	13.21 ±0.84	13.52 ±1.03
	V	13.50 ±0.89	13.60 ±0.91	13.83 ±1.02	14.14 ±1.02	14.22 ±1.00	14.16 ±1.02
TEC (10⁶/μL)	I	5.70 ±1.02	5.40 ±1.03	5.40 ±0.96	5.50 ±1.05	5.70 ±1.02	5.60 ±1.03
	II	7.62 ±0.90 ^β	7.59 ±0.88	7.66 ±0.89	8.22 ±1.02	8.21 ±0.91*	8.14 ±1.02*
	III	7.58 ±0.94 ^β	6.88 ±0.94	6.71 ±1.01	5.32 ±1.03	5.41 ±1.04*	5.52 ±1.03**
	IV	7.36 ±0.97 ^β	6.24 ±0.92	6.18 ±0.98	5.82 ±1.03	5.68 ±1.03*	5.62 ±0.92*
	V	7.44 ±1.03 ^β	6.32 ±1.01	6.20 ±0.97	6.72 ±0.92*	5.38 ±0.89**	5.81 ±0.96**

PCV (%)	I	37.62 ±1.04	37.63 ±1.05	37.58 ±0.89	37.67 ±1.03	37.59 ±1.05	37.69 ±1.03
	II	42.20 ±1.03 ^β	43.10 ±1.03 ^β	44.33 ±1.02	44.79 ±0.90	46.32 ±1.03**	47.12 ±1.02**
	III	44.30 ±1.02 ^β	43.19 ±1.03 ^β	41.33 ±1.03	39.32 ±1.02*	39.82 ±0.90*	37.33 ±1.02**
	IV	44.86 ±0.90 ^β	42.13 ±1.03	40.13 ±0.90*	38.41 ±3.64*	37.42 ±1.02**	37.12 ±1.03**
	V	44.23 ±1.03 ^β	41.38 ±0.96	38.74 ±0.98*	38.40 ±1.03*	37.60 ±1.01**	37.70 ±1.03**

β=P < 0.01 Significant at 1% level in respect to the healthy animals.

*= P < 0.05 Significant at 5% level in respect to the 0 day value of that group

**= P < 0.01 Significant at 1% level in respect to 0 day value of that group.

The mean Haemoglobin values (table-1) showed moderate improvements following therapy in Gr.III, IV and V concomitant with Bhat *et.al* (2012). There was a significant (P<0.01) high level of TEC values on 0 day in all the groups which might be due to the haemoconcentration (Moon, 1978). Following treatment, significant (P<0.05) improvements were noted on 10th day in Gr.III and Gr.IV and on 7th day in Gr.V was mostly due to the administration of RL, which supplemented the fluid to check dehydration and controlled the haemoconcentration. Ranitidine and Ondansetron helped to check the vomition and also the loss of fluid. Ceftriaxone, interfered the biosynthesis of peptidoglycan component of the bacterial cell and Tazobactam enhanced the activity of β-lactam antibiotics against the β-lactamase producing bacteria, helped to control the enteric bacterial infections causing diarrhoea and also corrected the haemoconcentration.

A combination of Norfloxacin and Tinidazole given in Gr.III and Ofloxacin and Ornidazole given in Gr.IV and V, effectively controlled the gastrointestinal infections, checked the diarrhoea and helped to manage the TEC levels. The early improvement in Gr.V diarrhoeic pups was due to the use of probiotics which helped to control the harmful intestinal pathogens, maintained the

beneficial gut microflora level and also helped to improve the intestinal health (Pothoulakis, 2009).

There was significant (P<0.01) high value of the PCV on 0 day in all the groups due to haemoconcentration and following treatments, significant (P<0.05) declinations were noted on 7th day in Gr.III and on 4th day in Gr.IV and V indicating effective antibacterial and other supportive therapies in these groups. Following treatments, the values of TLC declined significantly (P<0.05) on 15th day in Gr.III, on 7th day in Gr.IV and on 4th day in Gr.V. T-Cef XP used parenterally in all the treated groups, helped to reduce the bacterial infections and in turn reduced the TLC. Norfloxacin is a broad spectrum quinolone is effective against both the gram + ve and gram - ve organisms, acts by inhibiting the DNA gyrase, necessary for separation of the bacterial DNA strands and thus helps to inhibit the cell division as well as kills the bacteria to correct the enteritis (Rejo *et al*, 1997) .

Similarly, Ofloxacin and Ornidazole used in Gr.IV and V, helped to treat the enteritis effectively by controlling the bacterial infections also reflected by reduced TLC. The fluoroquinolones interferes with the DNA replication by inhibiting the DNA gyrase. In this study, Gr.V pups showed

better results than Gr.IV, due to use of probiotics containing Diarhoff (Pothoulakis, 2009). There was significant ($P < 0.05$) changes of Neutrophil % before treatment but

following treatment, declination was noted in all the treated groups on 10th day due the variable chemotectic effect (Vegad, 1995).

Table 2: Total Leukocytic counts and Neutrophil as well as Lymphocyte percentages in pups before and after treatment

Parameter	Group	0 day	2 nd day	4 th day	7 th day	10 th Day	15 th day
TLC ($\times 10^3/\mu\text{L}$)	I	8.82 ± 1.02	8.71 ± 0.91	8.62 ± 0.96	8.43 ± 0.95	8.47 ± 0.90	8.51 ± 0.98
	II	12.29 $\pm 1.02^\beta$	13.78 ± 1.00	14.63 ± 1.03	14.77 $\pm 1.02^*$	14.77 $\pm 0.99^*$	14.76 $\pm 0.96^*$
	III	12.20 $\pm 0.91^\beta$	11.41 ± 0.90	11.34 ± 0.88	10.40 ± 0.91	10.39 ± 0.91	9.40 $\pm 0.97^*$
	IV	11.87 $\pm 1.05^\beta$	12.58 ± 1.03	12.75 ± 0.99	10.73 $\pm 1.01^*$	9.75 $\pm 1.01^*$	8.84 $\pm 1.03^{**}$
	V	12.39 $\pm 1.02^\beta$	11.65 ± 1.05	10.50 $\pm 1.03^*$	9.60 $\pm 1.03^{**}$	8.60 $\pm 1.04^{**}$	8.54 $\pm 1.05^{**}$
Neutrophil (%)	I	63.52 ± 0.91	64.40 ± 0.89	66.55 ± 1.02	65.30 ± 0.90	64.39 ± 0.97	63.41 ± 0.88
	II	73.62 $\pm 0.91^\beta$	77.12 ± 0.97	77.25 $\pm 1.03^*$	77.36 $\pm 1.03^*$	77.12 $\pm 1.03^*$	78.24 $\pm 1.03^{**}$
	III	72.22 $\pm 1.03^\beta$	72.42 ± 1.02	71.22 ± 0.92	72.33 ± 0.91	65.40 $\pm 0.89^*$	64.50 $\pm 0.91^*$
	IV	73.32 $\pm 1.00^\beta$	72.61 ± 1.06	71.72 ± 1.02	71.33 ± 0.91	66.44 $\pm 0.93^*$	65.35 $\pm 0.91^*$
	V	73.71 $\pm 1.03^\beta$	72.73 ± 1.02	70.52 ± 1.03	70.74 ± 0.90	65.45 $\pm 0.88^*$	63.56 $\pm 0.91^{**}$
Lymphocyte (%)	I	27.21 ± 0.90	25.62 ± 0.90	25.19 ± 0.91	25.15 ± 0.97	25.76 ± 0.95	24.42 ± 0.97
	II	22.13 $\pm 1.02^\beta$	22.34 ± 1.03	22.21 ± 0.97	20.20 ± 1.01	20.18 ± 0.96	19.12 $\pm 0.89^*$
	III	22.18 $\pm 1.03^\beta$	22.37 ± 0.99	23.24 ± 1.01	23.25 ± 1.01	23.72 ± 1.02	24.86 $\pm 1.00^*$
	IV	22.32 $\pm 0.95^\beta$	22.12 ± 0.96	22.11 ± 1.02	24.12 ± 1.01	24.74 $\pm 1.04^*$	25.23 $\pm 0.99^{**}$
	V	22.11 $\pm 0.97^\beta$	22.12 ± 0.97	25.13 ± 0.97	26.12 $\pm 1.03^{**}$	27.29 $\pm 0.90^{**}$	27.74 $\pm 0.89^{**}$

$\beta = P < 0.01$ Significant at 1% level in respect to the healthy animals.

* = $P < 0.05$ Significant at 5% level in respect to the 0 day value of that group

** = $P < 0.01$ Significant at 1% level in respect to 0 day value of that group.

The significantly ($P < 0.01$) low Lymphocyte percentages on 0 day in pups of Gr.II, III, IV and V in comparison to the healthy pups of Gr.I, was due to the increased migration of the neutrophils, eosinophils and monocytes to the inflammatory sites for avoiding immunity (Vegad, 1995). However, the values gradually increased thereafter with treatment and became normal at the end of the experiment in all the treated groups.

From the above findings, it could be concluded that, the treatments given with antibacterials and other supportive therapies in acute bacterial enteritis in pups were useful in combating the enteritis.

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