PRELIMINARY OBSERVATIONS ON *ESCHERICHIA COLI* INFECTION IN NEONATAL CALVES IN EASTERN PROVINCE OF SAUDI AROBIA

Abduslam Abdullah Bakhsh Alhendi
Department of Clinical Studies, College of Veterinary Medicine and Animal Resources, King Faisal University, Al-Ahsa, Saudi Arabia

ABSTRACT

Five neonatal calves with diarrhoea were presented to the Veterinary Teaching Hospital for treatment. Main clinical signs and results of faecal examination were reported. *E. coli* was isolated from all calves. Mixed isolates of *E. coli* and *Proteus* spp. were found in 3 calves. No mortality was observed among examined calves. The *E. coli* isolated was subjected to antiobiotic sensitivity test against six antibiotics. Various aspects concerning diarrhoea in neonatal calves are discussed.

Keywords: Neonatal calves, E. coli infection, Saudi Arabia

INTRODUCTION

Diarrhoea in neonatal ruminants is a syndrome of great etiological complexity and is a common problem affecting animals in their first few weeks of life. Diarrhoea occurs despite of partial immunity which might be gained by neonates from their dams. The disease causes loss of animal health and death may occur due to enterotoxicity of causative agents. Many agents have been incriminated as a causative agent of diarrhoea especially *E. coli, Salmonella spp*; viruses and *Cryptosporidium* (Khan and Khan, 1991; Snodgrass, 1995).

Isolation of *E. coli* as a main cause of diarrhoea in calves was reported from Pakistan (Hafiz and Khan, 1993; Khan and Khan, 1997), Egypt (El-Ged *et al.*, 1994) and Britain (Daniel *et al.*, 1998). Also, presence of *E. coli* in livestock cattle in Japan was also recorded (Sekiya, 1997).

An outbreak of neonatal calf diarrhoea was reported in a dairy farm of Saudi Arabia and *E. coli* was recovered from the faecal samples, a total 480 (73%) calves out of 662 were affected (Hafez *et al.*, 1987). Neonatal calves (n=120) with diarrhoea were presented to the Veterinary Teaching Hospital, King Faisal University during the last ten years (Anonymous 1989-98).

This study was meant to provide preliminary clinical observations on neonatal diarrhoea in five calves examined at the Veterinary Teaching Hospital, King Faisal University. Also to determine the suitable different types of antibiotics under local conditions for such calves.

MATERIALS AND METHODS

Study was undertaken in five calves which were presented to the medical clinic in ill condition with profuse diarrhoea. Those calves were subjected to details clinical examinations (Table 1). Faecal sample were collected under strict aseptic conditions for bacteriological examination. These samples were streaked immediately onto plates of MacConkey's agar and incubated aerobically at 37°C for 24-48 hours. Isolated colonies were detected and picked up and transferred to slope of nutrient agar, and further incubated at 37°C for 24 hours. The organisms were identified by using API 20E system (Bio Merieux sa, France). The disc agar diffusion method was used to test the isolated bacteria against six different antibiotics, according to the method of Koneman *et al.* (1992). Screening parasitological tests were also undertaken.

RESULTS AND DISCUSSION

Data of clinical examination of the five neonatal calves and macroscopical features of the faeces is presented in Table 1. The antibiotic sensitivity test of *E. coli* isolates against six antibiotics is recorded in Table 2.

In this investigation non of the five calves examined died, although calves No. 4 and 5 were brought in severely ill condition. The clinical signs recorded varied from animal to animal. It can be summarized that all animals showed typical clinical picture of diarrhoea. Pale mucus membranes, weakness, dullness, loss of weight, inability to stand to complete recumbency, sunken eyes and increased skin elasticity were observed.

Hind quarters and tail were stained with yellowish or greenish faecal material. Similar clinical findings were stated by Radostits *et al.* (1994). Although *E. coli* is a normal flora of calf intestines, the infection is uncommon by enterogenic *E. coli*. It was found that calves were three time more likely to shed *E. coli* after weaning than before weaning (Garber *et al.*, 1995). In studies of 100 healthy and 100 diarrhoeic calves, the incidence of recovery of enteric bacteria from calves with diarrhoea was 96% and from normal calves was 43% (El-Ged *et al.*, 1994). The same authors found that *Enterobacteriaceae* were isolated more frequently in the Winter and *Clostridium* in the Autumn.

In this investigated cases, *E. coli* was isolated from all calves (100%), and proteus sp. from three calves as a mixed isolates with *E. coli*. Report on isolation of *Proteus mirabilis* from enteritis of captive herbivorous animals was stated by Chakraborty *et al.* (1997). Parasitoloigical examinations revealed negative findings in all calves studied.

and adult cattle showed that after inoculation 25 out of 29 animals remained healthy and 4 out of 17 had transient diarrhoea (Cray and Moon, 1995). Exposure to infected livestock caused severe and intermittent bloody diarrhoea in human (Rice *et al.*, 1996).

In the present work non of the calves died although severe clinical signs were associated with diarrhoea and treatment of examined calves were done by suitable antiobiotics, for several days, combined with fluid replacement and resulted in improvement of conditions. Treatment of diarrhoea by danofloxacin resulted in a significantly improved clinical condition, increased weight gains and few mortalities (Holack *et al.*, 1994).

. *E. coli* was isoalted from the nose of healthy camels (Alhendi, 1999) and from the nasopharangeal swabs of healthy cattle (Alhendi, 1989), which indicates that *E. coli* may be found in the nose of animal as normal inhabitant and/or commensal.

Table 1: Clinical data of 5 neonatal calves with dirrhoea (*E. coli* infection).

Calf No.	Age (days)	Weight (kg)	Temp. (°C)	Heart rate/min.	Respiratory rate/min.	Clinical signs	Faecal characters
1	6	20	39.1	100	45	Pale m.m., anorexic, weak, dull, slight dehydrate	Yellowish, watery.
2	20	25	37.0	70	25	Normal m.m., reduced appetite, slight dehydrated	Profuse, yellowish, watery.
3	25	30	39	66	40	Normal m.m., Anonexic, slight, loose skin elasticity	Soft, yellow-greenish
4	35	40	40	84	20	Pale m.m., reduced appetite, sunken eyes, recumbent, weak	Mucus with faeces, greenish, bad odour
5	40	35	38.5	65	35	Pale m.m., anorexic, depressed unable to stand, emaciated, weak	Profuse watery, brownish, very few blood stained colour

mm = mucus membrane

Table 2: In vitro antiobiotic sensitive of *E. coli* isolated from 5 diarrhoeic calves.

Antibiotics	Dose/disc (µg)	Animal Number				
		1	2	3	4	5
Kanamycin	10	+	++	++	R	+
Gentamicin	10	++	R	+++	R	++
Streptomycin	10	R	R	+	R	R
Oxytetracyclin	30	R	R	+	R	R
Erythromycin	15	++	+++	R	R	++
Neomycin	10	R	+	R	+	R

+ = Narrow zone inhibition; ++ = Intermediate zone inhibition; +++ = Large zone inhibition; R = Resistant

There are several sources of *E. coli* where it can be isolated. A survey in the USA, revealed that *E. coli* was isolated from bovine faecal samples on 12 farms with a herd prevalence of 1.1 to 6.1%, and was found in 1 out of 90 (1.1%) equine faecal samples, 2 out of 65 (3.1%) canine faecal samples, 1 out of 200 pooled bird samples (0.5%), 2 out of 65 pooled fly samples (3.3%) and 10 out of 320 (3.1%) water samples (Hancock *et al.*, 1998). Experimental infection of *E. coli* in calves

The *E. coli* isolates from five calves were subjected to six antibiotics sensitivity test. Kanamycin, Gentamicin and Erythromycin were not more effective than Streptomycin, Oxtetracline and Neomycin (Table 2). The antibiotics susceptibility of *E. coli* strains was investigated by a number of workers, among these are Holack *et al.* (1994) and Mellata *et al.* (1998). Their results indicated variability in susceptibility of different *E. coli* stains to different antibiotics.

It is important to emphasize that antibiotics susceptibility tests are tended to be a guide to the clinician, not a guarantee that antimicrobial agent will be effective in the vivo therapy (Koneman *et al.*, 1992).

The diarrhoeal disease can not be eliminated from neonatal calves as many causes other than *E. coli* are involved. The control and subsequent prevention of disease should be based on those factors like, reducing pathogen challenge and increasing the resistance of the calf. Attempt should be made to increase the amounts of colostral immunoglobulins absorbed by calf. Good management should be at maximum level during first few weeks of neonatal life (Radostits *et al.*, 1994).

REFERENCES

Alhendi, A.A.B., 1989. Infectious diseases of the upper and lower bovine respiratory tract. Ph.D. Thesis, University of Glasgow, Scotland, U.K.

Alhendi, A.A.B., 1999. Nasal microflora of camels (*Camelus dromedarius*) under two different conditions. Pakistan Vet. J., 19: 164-167.

Anonymous, 1989-98. Annual Reports, Veterinary Teaching Hospital, College of Veterinary Medicine and Animal Resources, King Faisal University, Al-Ahsa-31982, King Faisal University Press, Saudi Arabia

Chakraborty, A., B. Chaudhury and D.K. Sharma, 1997. Isolation of bacteria from captive herebivores. Indian J. Comp. Micro. Immu. & Infectious Dis., 18: 147-152.

Cray, W.C.Jr. and H.W. Moon, 1995. Experimental infection of calves and adult cattle with *Escherichia coli* 0157: H7. Applied and Environ. Micro., 61: 1586-1590.

Daniel, R., L. Matthews and G. Willshaw, 1998. Isolation of *E.coli* 0157 from a calf with dysentery. Vet. Rec., 143: 56.

El-Ged, A., Z.M. El-Sayed, A. Khalid, G.A. El-Gaber, M.A. El-Rahman and M.M. El-Bardisy, 1994. Studies on the role of Clostridial organisms and other bacteria in calf diarrhoea with special reference to their susceptibility to some anti-bacterial agents. Assiut Vet. Med. J., 30: 194-215.

Garber, L.P., S.J. Wells, D.D. Hancock, M.P. Doyle, J. Tuttle, J.A. Shere and T. Zhao, 1995. Risk factors for fecal shedding of *Echerichia coli* 0157: H7 in dairy calves. J.A.V.M.A., 207: 46-49.

Hafez, S.M., A.I. Radwan, A. Al-Mukayell and K. Abou-Sarah, 1987. Preliminary studies on neonatal calf diarrhoea in Saudi Arabia. Annual Symposium of Saudi Biological Society, 10: 282. Abstract.

Hafiz, M.A.H. and A. Khan, 1993. Pathological and bacteriological studies on neonatal calf diarrhoea. Abstract, MSc, Thesis. Pakistan Vet. J., 13: 49.

Hancock, D.D., T.E. Besser, D.H. Rice, E.D. Ebel, D.E. Herriot and L.V. Carpenter, 1998. Multiple sources of *E. coli* 0157 in feedlots and dairy farms in the Northwesern USA. Preven. Vet. Med., 35: 11-19.

Holack, T., D. Raemdonck, J. Davidson, T. Terhune and E. Lentz, 1994. Evaluation of danofloxacin for the treatment of diarrhoea in neonatal calves caused by enterotoxigenic K99+ *Escherichia coli.* In: Proc. 18th World Buiatrics Cong. 26th Cong. Italian Assoc. Buiatrics, Bologna, Italy, August 29-September 2, 1: 635-638.

Khan, A. and M.Z. Khan, 1991. Aetiopathology of neonatal calf mortality. J. Islamic Acad. Sci., 4: 159-165.

Khan, A. and M.Z. Khan, 1997. Bacteria isolated from natural cases of buffalo and bovine neonatal calf diarrhoea, pneumonia and pneumoenteritis. Vet. Arhiv; 67(4): 161-167.

Koneman, E.W., S.D. Allen, W.M. Janda, P.C. Schreckenbuger and W.C. Win, 1992. A colour Atlas and Textbook of Diagnostic Microbiology. 4th Ed., J.B. Lippincott Co., Philadelphia.

Mellata, M., E. Jacquemin, R. Bakour and J. Mainil, 1998. Antibiotic resistance in *Escherichia coli* strains of bovine and avian isolation in Algeria. Annales de Medecine Veterinaire, 142: 129-138.

Radostits, O.M., D.C. Blood and C.C. Gay, 1994. Veterinary Medicine, A Testbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses. 8th Ed., Bailliere Tindall.

Rice, D.H., D.D. Hancock, R.L. Vetter and T.E. Besser, 1996. *Echerichia coli* 0157 infection in a human linked to exposure of infected livestock. Vet. Rec., 138: 311.

Sekiya, J., 1997. *Escherichia coli* 0157:H7 in livestock in Japan. Revue Scientifique et Techniqe- Office International des Epizooties, 16: 391-394.

Snodgrass, D.R., 1995. Calf scour. The Moredun Fundation for Animal Health and Welfare, U.K. News Sheet, 2: 9.