Cryptosporidium parvum – an emerging protozoan parasite of calves in India associated with diarrhoea among children

Of the 18 valid species of *Cryptosporidium* (Protozoa: Apicomplexa) from fish, reptiles, birds and mammals reported from different parts of the world, seven species are known to be emerging gastrointestinal parasites of zoonotic importance. Among the parasites, two species, *C. parvum* and *C. andersoni* are found to exist among calves in India. The first Indian report of *C. parvum* was in 1992, in calves from Uttar Pradesh[1]. Its association with diarrhoea in children of some states of India has also been established and it is becoming a growing paediatric problem. The present position of cryptosporidiosis due to *C. parvum* in India and abroad has been reviewed[2]. The recent addition of a second species, *C. andersoni* in calves[3] during the early part of this year is an added concern to veterinarians, though its human occurrence is not known.

Cryptosporidiosis is mostly a water and food-borne infection. The infective stage is the fully formed oocysts of the parasite, which are passed in the faeces and transmitted to a second individual via the faecal–oral route. The disease is seen in young calves. Clinically, the older calves are asymptomatic, but continuously shed oocysts in faeces contaminate the environment and become the source of infection to man.

Reported incidence of *C. parvum* in diarrhoeic and non-diarrhoeic bovine calves was mostly within the range 7.8–86.4% from the northern, eastern and southern regions of India, including Andhra Pradesh, Puducherry, Punjab, Uttar Pradesh and West Bengal. High mortality rate of 35.2% among young calves between 0 and 30 days was observed in Punjab. Human incidence of 1.0–9.80% was reported from Kolkata and South India. The possibility of zoonotic transmission of this infection is of considerable significance, especially in rural areas depending on the sanitary condition. High incidence of infection was reported in rainy season.

In calves, *C. parvum* infection is established within five days after consumption of oocysts and it results in profuse watery or pasty diarrhoea mixed with blood, mucus and undigested milk clots, associated with mild to moderate dehydration, mild fever or subnormal temperature, depression, lethargy and varying degrees of anorexia[4]. Calves suffering from malnutrition, avitaminosis and immunodeficiency syndrome are highly prone to infection.

Affected children show greenish, watery, profuse foetid diarrhoea with 8–10 motions per day, dehydration, abdominal pain, fever and nausea in acute infection, while failure to gain weight and malnutrition resulted in stunted growth in chronic cases with great impact on paediatric health. Recovery will be spontaneous though oocysts will be continuously passed in stools of immunodeficient cases like AIDS patients. Prolonged infection with diarrhoea is potentially life-threatening.

For identification of oocysts, the modified Ziehl–Neelsen staining method is efficient and reliable. Potential effectiveness of PCR for the detection of *C. parvum* directly from faecal samples of cattle was verified for the first time from West Bengal[5]. Concentration of faecal sample using Sheather's sugar flotation technique is beneficial when the number of oocysts is too small. IFAT with anti-*C. parvum* oocyst monoclonal antibody was more sensitive than conventional staining. ELISA and PCR–RFLP are useful for the confirmation of microscopical examination. *C. andersoni* infection in Indian calves was confirmed by two-step nested PCR assay targeting 18S ssu rRNA gene[2].

No antibiotic is fully recognized as effective against the disease. Nitazoxanide, decoquinate, sulphaquinoxaline and halofuginone lactate have shown therapeutic and paromycin prophylactic effect in calves. A recent report indicated that azithromycin is the drug of choice for early clinical recovery and oocyst clearance followed by tylosin in calves[4]. Supportive treatment for dehydration with electrolyte solutions will be effective. Children treated for diarrhoea with antibiotics provided favourable condition in the intestine for colonization of this parasite as well as prolongation of diarrhoea and therefore, this should be avoided.

Since the oocysts are highly resistant to chemicals and environmental stresses, the control of infection is difficult. However, certain hygienic precautions can be taken to prevent its transmission. Washing hands after working in the soil, using toilets and handling pets, and drinking protected water (boiled, filtered through one micron filters or ozonized) or pasteurized dairy products can reduce the incidence. Dairy farmers and the people living in villages amidst cattle are more exposed to the infection and have to take more care. Cattle sheds and surroundings should be kept clean and fly-free. Straws used as beddings for diarrhoeic calves should be burnt. Monitoring and surveillance of all diarrhoeic cases in infants and calves for cryptosporidiosis should be given utmost priority in order to avoid the impending situation.

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