

COMPARATIVE EFFICACY OF DIFFERENT THERAPEUTIC REGIMEN FOR NATURAL CRYPTOSPORIDIOSIS IN KIDS

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ABSTRACT

Comparative efficacy of different therapeutic regimen was assessed against natural cryptosporidiosis in goat kids on the basis of percentage reduction in faecal oocysts count. Respective reduction in percent oocysts count at 5 days post treatment were 44%, 41% and 43% in group G₂ (n=5), G₃ (n=5) and G₅ (n=5) given tylosin @ 20mg/kg body weight intramuscularly, tylosin @ 20 mg/kg body weight orally, and tylosin and toltrazuril both at same dose rate orally. In group G₄ (n=5) percentage reduction in oocyst count was 22% after 5 days of treatment. Maximum reduction percentage in oocyst count was seen in group given tylosin and toltrazuril both at 10 days post treatment. So tylosin @ 20 mg/kg body weight was found effective against natural cryptosporidiosis in goat kids.

Keywords: Cryptosporidiosis, Goat Kids, Oocyst Count, Toltrazuril, Tylosin

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Cryptosporidium is a protozoan parasite which affects gastrointestinal tract of wide variety of animals, including mammals, reptiles and birds. The disease is devastating in immuno-compromised animals but self limiting in immuno-competent animals (Shahiduzzaman and Dausgies, 2012). The parasite occupies a specific location in the gut epithelium i.e. intracellular and extra cytoplasmic which may be the reason why most of the drugs used against the infection have limited efficacy (Radostits *et al.*, 2010).

As the pathology of the infection is not very much clear, assessment of the therapeutic efficacy on the basis of improvement of clinical symptoms only, may not be rewarding (Temizel *et al.*, 2011). Further, the studies based on assessment of reduction in oocyst per gram (OPG) counts may be useful as the organism has faeco-oral route of transmission and environmental oocyst contamination may have a role in precipitation of the disease. Therefore, the drugs which reduce OPG will in turn reduce the losses caused by the organism to the animal and will also reduce the chances of new infections by reducing pasture contamination. Most of the drugs used against the infection have resulted in poor clinical efficacy against the infection (Castro-Hermida *et al.*, 2004). There are limited studies on treatment aspect of *Cryptosporidium* infection in goats (Viel *et al.*, 2007; Petermann *et al.*, 2014). This protozoan parasite is thought to be associated with gastrointestinal disturbances, morbidity, delayed maturity, production losses and cost of treatment of ailing animals. As cryptosporidiosis has limited treatment options,

therefore the study was planned to know the efficacy of tylosin and toltrazuril against this infection in goat kids.

A total of 25 goat kids showing *Cryptosporidium* oocyst in the faeces were included in the study and were randomly divided into five groups of five kids in each. The therapeutic regimen of these groups was as given in the Table 1. Group G₁ was kept as untreated control while G₂ to G₅ were treatment groups. Response to treatment was seen on the basis of percentage reduction in faecal oocysts count. The faecal samples were analysed by a quantitative method for estimation of the number of *Cryptosporidium* oocysts per gram (OPG) of faeces as described by Grinberg *et al.* (2002) with some modifications. After mixing the faecal sample, 1 g of faecal material was thoroughly mixed in 10 ml of tap water and strained through a 100 mesh sieve. The suspension was centrifuged at 1500 rpm for 10 minutes and the sediment was resuspended in 4 ml of normal saline. Then 10 µl of this suspension was deposited as a drop on a slide, air-dried and fixed in methanol for one minute. The slide was stained with concentrated carbol fuchsin, rinsed with water and decolorised in 10% sulphuric acid for about 10 seconds. After rinsing with water, the slides were counterstained with 0.5% malachite green for one minute. The entire area of the smear was examined and the red-stained oocysts were counted. Percentage reduction in OPG was calculated after treatment to know the comparative therapeutic efficacy of different regimen. Statistical analysis was done by one way ANOVA as described by Snedecor and Cochran (1994).

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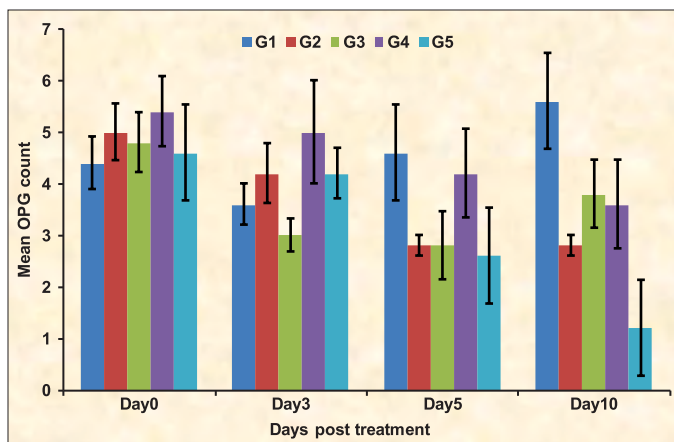


Fig.1. Comparative efficacy of different therapeutic regimen in cryptosporidiosis in kids

Results of therapeutic studies are shown in Fig. 1. When treatment groups were compared in group G₂, G₃ and G₅ at five days interval, percentage reduction in OPG counts were 44, 41 and 43, respectively while in group G₅ at ten days interval, maximum reduction in percentage OPG (74%) was seen. In group G₄ i.e. group given toltrazuril only, 22% reduction in OPG was seen at 5 days of treatment. This indicated that in group G₂, G₃ and G₅, tylosin being the common factor, is an effective therapy for cryptosporidiosis as compared to that of toltrazuril. When tylosin was given along with toltrazuril, 43% reduction was seen in percentage OPG counts at five days but at ten days interval, the reduction was highest i.e. 74%. When mean OPG of group G₂, G₃, G₄ and G₅ were statistically compared with group G₁ at 3rd, 5th and 10th day post treatment, the differences were significant ($p < 0.05$) in group G₂ at 5th day and group G₃ at 5th day and in group G₅ at 5th and 10th day post treatment. This result further indicated that tylosin was better than toltrazuril alone for treating cryptosporidiosis in goat kids.

As *Cryptosporidium* is having specific location i.e. intracellular and extra-cytoplasmic in the gut epithelium, its treatment is difficult. Further two types of oocysts are formed in its life cycle, thin and thick walled. Only thick walled oocysts come out of the body. It has been reported as one of the enteric pathogens in goat kids (de Graaf *et al.*, 1999). Therapeutic studies on cryptosporidiosis in goats are limited. Tylosin has also been used against cryptosporidiosis in goat kids and was found effective in reducing clinical signs (Temizel *et al.*, 2011) but percentage reduction in oocyst count was not seen by them. The present study showed that tylosin is effective in reducing percentage OPG count after five days of treatment in naturally infected kids. Tylosin might suppress the intestinal cycle of the parasite. Some older literature indicated that tylosin was apparently successful

Table 1

Treatment groups for *Cryptosporidium*

Group (n=5)	Therapeutic regimen
G ₁	RL slow I/V as per the dehydration percentage
G ₂	Tylosin @ 20 mg/kg BW I/M, SID x 5 days
G ₃	Tylosin @ 20 mg/kg BW PO, SID x 5 days
G ₄	Toltrazuril @20mg/kg BW PO, SID x 5 days
G ₅	Tylosin @ 20 mg/kg + Toltrazuril @ 20 mg/kg BW PO, SID x 5 days*

*RL slow I/V as per the dehydration percentage.

in blocking oocyst shedding in dogs and cats with cryptosporidiosis (Tams, 1996). Tylosin is a member of macrolide group of antibiotics and some macrolides like spiramycin (Galvagno *et al.*, 1992), clarithromycin (Cama *et al.*, 1994) and azithromycin (Elitok *et al.*, 2005) were found to be effective against opportunistic pathogens associated with immunosuppression like *Cryptosporidium*. Agrawal *et al.* (2018) also found azithromycin, a macrolide group of antibiotic, more effective as compared to that of nitazoxanide for *Cryptosporidium* infection in calves. Tylosin was used @ 20 mg/kg for five days by Duru *et al.* (2013) against cryptosporidiosis in calves and was found effective. Tylosin was used orally @ 11mg/kg BW, BID for 28 days to a chronically infected cat, and stools were normal within a week after initiating the therapy(Lappin *et al.*, 1997).

The study concluded that tylosin is better than tottrazuril for reducing faecal oocyst of *Cryptosporidium* in goats but the combination of the two was more effective than tylosin or toltrazuril alone.

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