ANTHELMINTIC RESISTANCE IN GASTRO INTESTINAL NEMATODES OF GOATS*

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Abstract

Resistance to various anthelmintics in nematodes of goats of the University Goat Farm, Mannuthy was detected in vivo by faecal egg count reduction test (FECRT). Forty kids aged three to six months were used for this purpose. The drugs viz., Albendazole, Ivermectin and Morantel citrate showed a faecal egg count reduction per cent of 30, 53 and 45 with 52, 34 and 62 as lower 95 per cent confidence limits. Coproculture revealed the presence of larvae of Haemonchus, Oesophagostomum, Bunostomum and Strongyloides spp. that developed multiple resistance to these drugs due to their prolonged and continued use.

Key words: *Anthelmintic resistance, faecal egg count reduction test, kids, gastro intestinal nematodes.*

Currently anthelmintic resistance (AR) is not an emerging situation. It is something that has already emerged and is widely existing, alarming the livestock sector and pharmaceutical industry. It is nearly half a century since the first report of resistance to anthelmintics was made by Drudge *et al.* (1957) in the USA. In India, there are innumerable reports on the overwhelming emergence of resistant nematodes against benzimidazoles, levamisole, morantel and ivermectin (Varshney and Singh,1976; Singh *et al.*,1995; Yadav *et al.*,1995; Swarnkar *et al.*,1999; Jeyathilakan *et al.*, 2003; Dhanalakshmi *et al.*, 2003; Kumar *et al.*, 2004; Yadav and Garg, 2004) pertaining to sheep alone. The present paper deals with the *in vivo* detection of anthelmintic resistance in a goat farm in Kerala.

Materials and Methods

Kids of three to six months of age maintained in the University Goat Farm, Mannuthy were selected for the study. They were maintained in a semi intensive system letting out to graze during the day and housed at night. Regular anthelmintic treatment was carried out in the farm once in every three months using albendazole. Very recently, ivermectin was also introduced into the farm as an alternative drug. Kids that were not dewormed since three months were screened for parasitic ova. Those positive for nematode ova were divided into four groups A, B, C and D of ten each. Egg counts of all the 40 positive kids were taken and recorded as the pre treatment EPG. Group A was administered albendazole @ 7.5 mg/kg BW, Group B with ivermectin @ 0.2 ig/kg BW and Group C was given morantel citrate @ 10 mg/kg BW, all orally. Group D remained as the non medicated control. Egg counts of all the kids were recorded after 14 days as the post treatment EPG. The data were then analysed, applied in the RESO computer programme, for fecal egg count reduction test (FECRT) analysis (Coles *et al.*, 1992)

Faecal samples of the kids under study before and after drug trials were pooled and cultured (Sathianesan and Peter, 1970) for the identification of nematode larvae.

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Results and Discussion

As described in the World Association for the Advancement of Veterinary Parasitology (WAAVP) guidelines for the detection of anthelmintic resistance, faecal egg count reduction of less than 95% with lower 95% confidence limit below 90% indicates resistance to anthelmintics.

The faecal egg count reduction per cent of albendazole, ivermectin and morantel citrate were 30, 53 and 45 respectively with the lower 95% confidence limits being less than 90% in all the three drug trials. Albendazole was the most frequently used drug in the farm. Although ivermectin was frequently used, the oral preparation was introduced for the first time. Morantel citrate has been used occasionally for treating goats. The present study revealed resistance to albendazole, ivermectin and morantel in gastro intestinal nematodes.Coproculture revealed the presence of larvae of *Haemonchus contortus* (55.26%), *Oesophagostomum columbianum* (13.15%), *Trichostrongylus colubriformis* (21.05%), *Bunostomum trigonocephalum* (6.14%) and *Strongyloides papillosus* (4.38%).

The results of FECRT analyzed in the present study are presented in the table.

These results show evidence for the presence of resistant nematodes in goats against albendazole, ivermectin and morantel citrate. The lower efficacy and resistance to albendazole might be attributed to its continuous and prolonged use in the farm. Resistance to albendazole in gastro intestinal nematodes has been reported by Boersema and Pandey (1997), Waruiru *et al.* (1998), Maingi *et al.* (1998) and Dhanalakshmi *et al.* (2003) from Zimbambwe, Kenya, Denmark and Bangalore respectively. Taylor *et al.* (2002) found that regular use of any chemical to cohtrol infective organisms possess the risk of resistant population development. The resistance developed against ivermectin and morantel may be ascribed to the development of multiple resistance, as interpreted by Singh *et al.* (2002). Resistance against morantel citate has been reported by Sangster *et al.* (1979), Prichard (1994) and Yadav and Garg (2004). Though ivermectin resistance was also detected in the present study, it was more effective than the other two as it has been introduced only quite recently into the farm for treatment. Le Jambre (1993), Sivaraj *et al* (1994), Maciel *et al.* (1996) and Gopal *et al.* (1999) conform the above observation.

The emergence of a clinical resistance problem is the culmination of a selection process. This will be enhanced by the high biotic potential of the gastro intestinal worms especially *H. contortus*. Their fecundity can produce large numbers of generations within a short time, under favourable conditions. (Craig, 1993). This factor supplements to the development of resistance in our farm because one of the common nematode encountered is *H. contortus*. This pilot study forms the first report of anthelmintic resistance in goats in India. The present results and perusal on the voluminous literature on the same implies on the urgent need to resort to integrated parasite control involving bio control, immune therapy and breeding for worm resistance so as to slacken the development of resistance to anthelmintics.

Table. Anthelmintic resistance by Fecal Egg Count Reduction Test

Anthelmintic	Day zero (pre treatment EPG)	Day 14 (post treatment EPG)	Per cent reduction	Lower 95 per cent confidence limit	Upper 95 per cent confidence limit	Result
Albendazole	323	170	30	52	-2	Resistant
Ivermectin	210	113	53	34	07	Resistant
Morantel citrate	270	133	45	62	20	Resistant
Control	210	243	—	—	—	—

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