THERAPEUTIC EFFICACY OF DIFFERENT ANTHELMINTICS IN FASCIOLOSIS AFFECTED GOATS OF SOUTH GUJARAT

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ABSTRACT

Efficacy of three anthelmintics against fasciolosis in goats was evaluated based on clinical scores and qualitative as well as quantitative examination of faecal samples. A total of 40 fasciolosis affected anaemic goats having more than 100 egg per gram (EPG) of faeces were randomly allotted to four different treatment groups with 10 goats in each. The efficacy of Closental alone, Triclabendazole + Ivermectin and Oxyclozanide + Levamisole + Silymarine was evaluated in group-I, II and III, respectively, by administering with oral standard dose rate of 15.0, 10.2 and 10.0 mg/kg body wt once, respectively, whereas goats of group-IV were kept as untreated control. Based on egg per gram, the efficacy of Closental alone, Triclabendazole + Ivermectin and Oxyclozanide + Levamizole+ Silymarine was 99.63, 100.00 and 94.74%, respectively, on 7th day and 100.00, 100.00 and 97.38% on 30th day post-treatment, respectively. The results were also positively correlated with improvement in FAMACHA score, body condition score as well as haemoglobin concentration and packed cell volume. Therefore, it is concluded that an early diagnosis and treatment with newer drugs for fasciolosis in goats could be advised to reduce economic losses due to their better efficacy on fasciolosis.

KEYWORDS: Anthelmintics, Efficacy, Egg per gram, Clinical response, Fasciolosis, Goats

INTRODUCTION

Helminthiasis, especially parasitic gastro-enteritis, poses a serious health threat and limitation to the productivity of small ruminants due to the associated morbidity, mortality, treatment cost and control measures (Pedreira *et al*., 2006; Nwosu *et al*., 2007). Endoparasitism, especially infestation with cestodes, nematode and hepatic trematodes is widespread in farm animals (Maqbool *et al*., 2000). Among all, Fasciolosis and Haemonchosis are the most important pathogenic parasitic infections of sheep and goats. Both are distributed worldwide causing severe infection, anaemia and hypo-albuminaemia (El-Sahzly *et al*., 2006). Of these, fasciolosis is wide spread in small ruminants of India and is primarily caused by *F.gigantica* although *F.hepatica* is also reported in temperate Himalayan region (Khajuria and Kapoor, 2003; Yadav *et al*., 2006).

Generally, fasciolosisis characterized by anaemia due to severe liver damage as a result of tunneling through the liver parenchyma by immature fluke with extensive tissue damage and haemorrhage that culminate in severe clinical disease (Biffa *et al.*, 2006) with complications, like weight loss, drop in milk production, sub-mandibular oedema and diarrhoea (Radostits *et al*., 2000). Fasciolosis is mainly observed in chronic form, either in young animals during the rainy season due to recently acquired infections or in the dry season in older animals which are in poor condition and may not be able to withstand the effect of relatively small number of flukes. The infection of domestic ruminants with *Fasciola* spp. causes economic loss estimated over US $ 200 million per annum to the agricultural sector worldwide, with over 600 million animals infected (Ramajo *et al*., 2001). Chemotherapy with drug remains the most cost effective way of treating parasitic disease and it

is usually at the heart of any controlling campaign. The successful formulation and implementation of an effective strategic control plan depends on a periodic surveillance within given environment and associated risk factors that influence their transmission. Considering the importance of fasciolosis in goats the present study was planned.

MATERIALS AND METHODS

A total of 40 fasciolosis affected yet apparently healthy goats having more than 100 egg per gram (EPG) were randomly allotted to four different groups with 10 goats in each and treated as per the details given in Table 1. The efficacy of Closental alone, Triclabendazole + Ivermectin and Oxyclozanide + Levamisole + Silymarine was evaluated based on qualitative and quantitative methods of faecal sample examination on day 7th and 30th post-administration of anthelmintics.

Table 1: Treatment protocols to study efficacy of various anthelmintics in *Fasciola* spp. infected goats

Sr. No.	Treatment group	Detail of Anthelmintics used	Dose rate& route	No. of animal	Mean EPG
1	T1	Closental (Liq.Zenvet®, Intas Pharmaceuticals Ltd)	15.0 mg/kg body wt. PO	10	110.90
2	T2	Triclabendazole + Ivermectin (Liq. Ivulon®, TTK Healthcare Ltd.)	10.2 mg/kg body wt. PO	10	110.00
3	T3	Oxyclozanide + Levamisole + Silymarine (Liq.Flukisyl®, Bovian Healthcare Ltd.)	10.0 mg/kg body wt. PO	10	110.80
4	T4	Untreated Control group	No treatment	10	110.80

Fresh faecal samples were collected directly from the rectum of goats and kept immediately in plastic containers containing 10% formalin for preservation until used for examination. Qualitative examination was carried out for presence of parasitic eggs/oocysts under 10x magnifications of microscope. Quantitative examination of faecal samples of Fasciola spp. was carried out within 24-48 hrs of collection using a modified McMaster's technique to count EPG (Anonymous, 1977). Animal-wise FAMACHA score was carried out as per Bath *et al*. (2005), body condition score (BCS), haemoglobin and packed cell volume (PCV) was recorded, tabulated and analyzed by using one way variance analysis at $P<0.05$ on IBM SPSS statistical software version 20.0. The efficacy of anthelmintics was evaluated based on a formula given by Khayatnouri et al. (2011) as follow:

$$\% \text{ of drug efficacy} = \frac{P - R \times 100}{P}$$

Where, R = Average number of parasite egg in a gram of faecal sample after treatment.

P = Average number of parasite egg in a gram of faecal sample before treatment.

RESULTS AND DISCUSSION

The average EPG on the day of treatment was around 110 in all treatment groups. Randomly allotted goats were treated as per treatment protocol designed. During the study, mean EPG was significantly decreased in T1, T2 and T3 as compared to control group (T4) on 7th day of treatment. On day 30, all faecal samples were found negative for presence of eggs of Fasciola spp. in all three

treatment groups. The EPG in untreated control group was increased to 236 and 347 on day 7 and 30 of initiation of study (Table 2). Our findings are in agreement with the previous reports; Sheikh et al., 2005; Garedaghi et al., 2011) in which reduction in EPG was observed after anthelminitics treatment.

During therapeutic trial, the efficacy of Closental was 99.63% on 7th day of treatment. The result is in accordance with the observation of cent percent efficacy of Closental in Fasciola spp. infections of small ruminants by Dhand et al. (2004) and Singh et al. (2004) The efficacy of Triclabendazole was 100% on 7th day. Similarly, 97-100% efficacy of Triclabendazole treatment in Fasciola spp. infections of small ruminants was also reported by earlier researchers (Singh et al., 2004;), whereas Maqbool *et al*. (2000) observed slightly reduced (80%) efficacy of the same drug. The efficacy of Oxyclozanide + Levamisole + Silymarine was 94.74% on 7th day of treatment. On 30th day of treatment, the efficacy of Closental (T1) and Triclabendazole + Ivermectin (T2) was 100%. Similarly, higher efficacy (98-100%) of these drugs was also documented in previous reports (Sheikh *et al*., 2005; Shokier *et al*., 2013). The efficacy of Oxyclozanide + Levamisole + Silymarine (T3) was 97.38% on 30th day of treatment. Only single report of Shokieret al. (2013) recorded such higher efficacy of this combination in Fasciola spp. infections of small ruminants.

Table 2: Efficacy of different anthelmintics drugs at different time intervals

Treatment Groups	Mean EPG post-treatment		Efficacy (%)	
	On 7^{th} day	On 30^{th} day	On 7^{th} day	On 30^{th} day
T1 (Closental)	0.40 ± 0.30	0.00 ± 0.00	99.63	100
T2 (Triclabendazole + Ivermectin)	0.00 ± 0.00	0.00 ± 0.00	100	100
T3 (Oxyclozanide + Levamisole + Silymarine)	5.80 ± 1.36	2.90 ± 0.92	94.74	97.38
T4 (Control)	236.90 ±6.01	347.80±10.14	--	

Further, the efficacy of different anthelmintics was correlated with FAMACHA and body condition scoring as well as haemoglobin and PCV level before and after treatment. The details are given in Table 3. Comparatively significant improvement in all parameters was observed in T1, T2 and T3 as compared to T4 (control). The FAMACHA© Chart is a simple system to categorise the anemic status of small ruminants based on the colour of conjunctival mucosa on a scale from 1 (optimal eye color, red) to 5 (pale eye colour, white) (Bath et al., 2005). Significant improvement in FAMACHA after anthelmintics treatment has also been documented in previous studies (Van Wyk and Bath, 2002; Mahieu, 2007; Besier, 2008; Papadopoulos *et al*., 2013 and Yilmaz et al., 2014). Body condition scoring is a simple, easily applied clinical scoring by touching the tissue over the lumbar vertebrae, which appears to be promising for judging the overall health status of the animal. It was highly correlated with FAMACHA scores, haematocrit values and faecal egg counts (EPG) in the present study as was observed by Bath et al. (2005). The findings of significant improvement in mean haemoglobin concentration and PCV in anthelmintics treated groups as compared to untreated controls were in accordance with the earlier reports (Khalil et al., 2006; Okoye *et al*., 2013). The lower haemoglobin and PCV in infected and non-treated animals could be attributed to an abnormal

loss of red blood cells due to feeding habits of flukes or to an excessive destruction of RBCs caused by some heamolyzing factors produced by the flukes (Okoye et al., 2013).

Table 3: Average FAMACHA, BCS, haemoglobin and packed cell volume in goats before and 30 days post-treatment of anthelmintics in different groups

Sr. No.	Particular	Day	T1	T2	T3	T4	F value
1	FAMACHA Score	00	3.20^{a}	3.40^{b}	3.00^{a}	3.20^{a}	5.55*
		30	1.70^{b}	1.70^{b}	1.50a	3.25^{c}	165.66**
		F value	134.82**	441.33**	261.48**	1.26	--
2	BCS Score	00	1.30^{b}	1.20^{a}	1.20^{a}	1.20^{a}	6.01*
		30	2.80^{b}	3.00^{c}	2.70^{b}	1.20^{a}	13.05**
		F value	55.16**	62.67**	89.77**	0.42	--
3	Hb (gm%)	00	6.70^{b}	6.56^{b}	4.93^{a}	5.79^{a}	55.68**
		30	9.00^{c}	8.72^{b}	8.82^{b}	5.51^{a}	387.09**
		F value	679.36**	267.28**	1393.85**	0.68	--
4	PCV (%)	00	18.90^{c}	18.32^{c}	14.70^{a}	16.11^{b}	44.51**
		30	27.10^{b}	26.69^{b}	26.86^{b}	16.05^{a}	354.32*
		F value	450.79**	8.24**	729.47**	0.102	--

Means with different superscript (a,b,c,d) along a row differ significantly at p<0.01.

*** highly significant at p<0.01, * significant at p< 0.05.*

Overall efficacy of Closental and Triclabendazole + Ivermectin anthelmintics was comparatively higher than Oxyclozanide + Levamisole + Silymarine group which might be due to lack of the resistance of parasites to these drugs.

CONCLUSIONS

It is concluded that the knowledge of epidemiology and ecology of the parasites is needed not only for planning better strategies of parasitic control but also for providing insight into the natural processes of controlling parasite population. According to present results an early diagnosis of parasitic infections using FAMACHA and treatment with newer drugs could be advised to reduce economic losses due to fasciolosis in goats.

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