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Research Article

Comparative Evaluation of Different Anthelmintics in Sheep Naturally Infected with Gastrointestinal Nematodosis

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ABSTRACT

Present study was aimed at evaluating comparative efficacy of different anthelmintic used in sheep against gastrointestinal nematodosis. For this purpose an experimental trial was designed and conducted at MRCSG, Shuhama, Sinagar using fecal egg count reduction test. For the study, 30 animals suffering from gastrointestinal nematodosis were selected and divided into five different groups of 6 animals each. An additional group of 6 animals apparently free from any infection was taken as healthy control (Group VI). Each of the infected group (Group I, II, III and IV) was treated with a different anthelmintics (Fenbendazole, Ivermectin, Closantel and Artemesia respectively) except for one (Group V) that was kept as untreated infected control group. Faecal samples were collected on day 0 at the beginning of the experiment and also on day 7, 14, 21 and 28 post treatment and subjected to faecal egg count reduction test (FECRT) which showed highest efficacy against Ivermectin (91.93%) followed by Fenbendazole (89.09%), Closantel (59.25%) and Artemesia (34.61%). Mean±SE EPG at beginning (0th day) and the end (28th day) of the experimental trial in Ivermectin treated group and infected control group were 1033.33±172.56, 83.33±54.26 and 1116.66±74.91, 650.00±61.91 respectively.

Key words: *Anthelmintics, Efficacy, FECRT, Gastrointestinal Nematodosis, Sheep.*

INTRODUCTION

Livestock systems affect the natural resource base, public health, social equity and economic growth in positive as well as negative manner (World Bank 2009). The growth is driven by rapidly increasing demand for livestock products be it meat, milk or wool because of the ever growing population, urbanization and increasing incomes in developing countries. India being an agrarian economy ranks third in the world sheep population with 65 million sheep reared by about 4.55 million small and marginal farmers or landless labourers (19th Livestock Census, 2012).

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Jammu and Kashmir holds 3.38 million sheep accounting for 6.77% of total sheep population of country (19th Livestock Census, 2012).

Gastrointestinal nematodosis is a direct threat to health and productivity of sheep, as it endangers animal welfare in the tropical and subtropical areas (Swarnkar et al., 2010) and causes severe economic losses especially in developing countries (Jitendran & Bhat, 1999). The overall prevalence of GIT nematodes in sheep in kashmir has been repoterd to be 61.5% (Tariq et al., 2008). Commonly occuring gastrointestinal nematodes affecting sheep include Haemonchus contortus, *Ostertagia* spp., *Chabertia ovina, Trichostrongylus* spp., *Nematodirus* spp., *Bunostomum* spp., *Oesophagostomum* spp., *Cooperia* spp., *Marshallagi* spp., and *Trichuris* spp.(Tariq et al., 2008). Clinical symptoms include reduced feed intake, weight loss, reduced wool production, anaemia, lethargy, emaciation, oedema, and alternative diarrhea and constipation. In general, anorexia is observed in parasitized animals, which contributes to the loss of condition, poor weight gain and lowered efficiency of production. In parasitic infections, diagnosis is carried out based on clinical symptoms and laboratory examination of feces, blood, excretions and secretions of body for parasite or parasitic stages, or their eggs. Use of anthelmintics has been crucial in control programs for many decades. Although the intensive use of these drugs has resulted in resistance problems (Cezar et al., 2010). In some cases, ethnoveterinary medicines have shown certain potential as anthelmintics (Iqbal et al., 2007), but they cannot be used commercially until appropriate dosage, toxicity and active ingredients with mode of action are deciphered (Saddiqi et al., 2011).Therefore, it is important to establish de-worming strategies that consider this resistance problem and there is also need for use of alternative therapeutic agents.

MATERIALS AND METHODS

The present study was conducted to evaluate efficacy of different anthelmintics in sheep suffering from gastrointestinal nematodosis. The experiment was conducted at MRCSG, Shuhama, Kashmir wherein 30 animals naturally infected with and suffering from gastrointestinal nematodosis were selected and allotted to five different groups of 6 animals each. An additional group (Group VI) of 6 animals apparently free from any infection was taken as healthy control. Each of the infected group (Group I, II, III and IV) was treated with a different anthelmintic (Fenbendazole, Ivermectin, Closantel and Artemesia respectively) except for one (Group V) that was kept as untreated infected control group (Table 1).

Table 1: Schedule of treatment dosage and route of administration of different antihelminthics

Group	Anthelmintic drug	No. of animals	Dosage	Route	No. of treatments
I	Fenbendazole	06	5mg/kg body wt.	Oral	One
II	Ivermectin	06	0.2 mg/kg body wt.	S/C	One
III	Closantel	06	10mg/kg body wt.	Oral	One
IV	Artemesia absinthium	06	10g/animal	Oral	One
V	Untreated infected control	06	-	-	-
VI	Healthy control	06	-	-	-

Clinical examination

The animals suffering from gastrointestinal nematodosis were examined for consistency of faeces (watery, semi-solid or normal) loss of body weight ,anorexia, mucous membrane changes and presence of submandibular edema.

Drug trial

Comparative therapeutic efficacy of different anthelmintics was assessed on basis of improvement in clinical symptoms and reduction in mean eggs per gram (EPG) in the infected animals. Faecal EPG was recorded at the beginning of study i.e., 0th day and followed on 7th, 14th, 21st and 28th day post treatment using Stolls method (Soulsby, 1986).

Faecal egg count reduction test (in vivo test)

Efficacy of different anthelmintics used in drug trial was calculated by comparing mean eggs per gram (EPG) on 0th day pre-treatment and followed by 7th, 14th, 21st and 28th day post treatment using below formula:

$$\text{FECR (\%)} = \frac{\text{Mean EPG pre-treatment} - \text{Mean EPG post-treatment}}{\text{MeanEPG pre-treatment}} \times 100$$

RESULTS

In the present study the efficacy of drugs were calculated on the basis of improvement in clinical symptoms and reduction in eggs per gram (EPG) of faeces as presented in Table 2 & 3 and Figure 1.

Efficacy of Fenbendazole, Ivermectin, Closantel and Artemesia

In fenbendazole treated group a total of 23.63% reduction in faecal egg count was observed on day 7th post treatment and on 14th post-treatment, a faecal egg count reduction of 49.90% was recorded. However on day 28th post-treatment an overall efficiency of 89.90 percent was recorded. The results as presented in Table 3, show Fenbendazole as more effective than Closantel and Artemesia but less effective than Ivermectiin against gastrointestinal nematodosis in sheep. Pre-treatment eggs per gram (EPG) of faeces on day "0" in Ivermectin treated group was recorded as 1033.33±172.56 and a progressive decrease in the mean EPG was observed post treatment. The values recorded were 633.33±154.20, 450.00±102.47, 200.00±100.0 and 83.33±54.26 on 7th, 14th, 21st and 28th day respectively. Also reduction in faecal egg count of 38.71% was found on 7th day post-treatment followed by progressive reduction during the course of the experiment trial and finally on day 28th post-treatment, an efficacy of 91.93% was recorded. A single dose of Closantel lead to progressive decrease in the EPG causing 31.48% reduction in EPG count on 7th day, 42.59% on 14th, 53.70% on 21st, 59.25% on 28th day post-treatment. EPG count in the animals affected with gastrointestinal nematododsis and treated with Artemesia showed the efficacy of 10.57% on day 7, followed by increasing trend of 19.23%, 31.73% and 34.61% on day 14, 21 and 28 post-treatment respectively.

Table 2: Mean±Se EPG in sheep naturally infected with gastrointestinal nematodosis pre and post-treatment

Treatment	Day 0	Day 7	Day 14	Day 21	Day 28
Fenbendazole	916.67±83.33	700.00±81.65	466.67±95.45	383±70.32	100.00±0.00
Ivermectin	1033.33±172.56	633.3±154.20	450.0±102.47	200.00±100.00	83.33±54.26
Closantel	900.00±85.63	616.67±60.09	516.67±60.09	416.67±60.09	366.67±66.6
Artemesia	1733.3±185.59	1550.0±170.78	1400.00±146.05	1183.33±98.03	1133.3±102.2
Infected control	1116.66±74.91	966.66±71.49	866.67±94.41	766.67±121.10	650.00±61.91
Healthy control	00	00	00	00	00

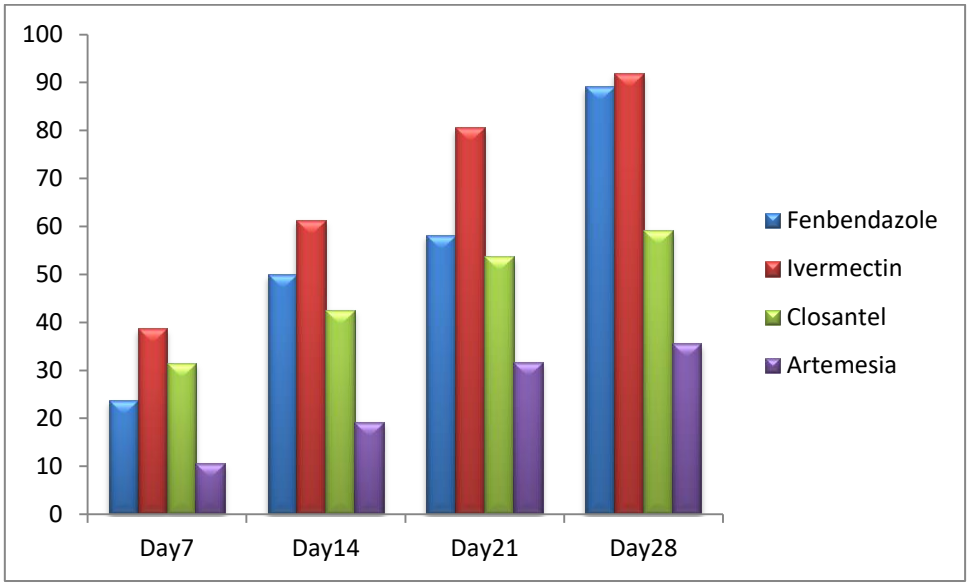

Figure 1: percentage efficacy of different anthelmintic drugs against gastrointestinal nematodes in sheep

Table 3: Percentage efficacy of different anthelmintic drugs against gastrointestinal nematoodosis in sheep

Treatment	Day 7	Day 14	Day 21	Day 28
Fenbendazole	23.63	49.90	58.18	89.09
Ivermectin	38.71	61.29	80.64	91.93
Closantel	31.48	42.59	53.70	59.25
Artemesia	10.57	19.23	31.73	34.61

A B

Figure 2: Artemesia spp. used in the drug trial. 1) Fresh Artemesia 2) Dried Artemesia shoots

DISCUSSION

The therapeutic efficacy of different anthelmintics was evaluatd against the gastrointestinal nematodosis in sheep. Results of efficacy for each drug was calculated using faecal egg count reduction test (FECRT). Treatment with fenbendazole @ 7.5mg/kg body weight in sheep given orally showed a reduction in EPG of 22.38% on 7th day post-treatment and reached 89.09% on 28th day post-treatment. Clinical symptoms also showed progressive results. This shows Fenbendazole as more effective than Closantel and Artemesia but less effective than Ivermectiin against gastrointestinal nematodosis in sheep. An efficacy of 88.24 to 100% has also been reported previously

by Srivastava et al. 1983 against gastrointestinal nematodes in sheep. Sheep suffering from infection were treated with Ivermectin @0.2mg/kg body weight S/C and on 7th day post treatment the drug showed efficacy of 38.71% and 91.93% on 28th day post treatment and improvement in the body condition was well noted. Pandith et al. (2004) reported an efficacy of 98.5% in Ivermectin @ 0.2mg/kg body weight against naturally occurring gastrointestinal nematodosis of sheep. Khalid et al.2004 also reported a significant reduction of EPG count on 7th, 14th, 21st and 28th day post-treatment. Closantel was given at dose rate of 10mg/kg body weight and showed reduction in EPG of 31.48% on 7th day which reached 59.25% on 28th day post treatment. Sarkar et al., (2006) reported 100% efficacy in haemonchosis affected sheep when given @ 15mg/kg body weight. Low efficacy of the Closantel might be due to high plasma protein binding property as a result of which it is effective against blood sucking GI nematodes like Haemonchus contortus and Bunostomum spp. only. Artemesia is an effective anthelmintic used against GI nematode infection in sheep (Iqbal, et al., 2004). The therapeutic efficacy of Artemesia in the present study showed reduction in EPG to 34.61% on 28th day post-treatment. Iqbal et al. (2004) reported an efficacy of 67.20% 0n 14th day post-treatment using Artemesia brevifolia (CAE) @ 3mg/kg body weight in sheep. The higher efficacy as reported by Iqbal et al. (2004) might be due to difference in dose as well as in extraction process.

CONCLUSION

Among standard anthelmintics given on regular basis in sheep, Ivermectin @ 0.2mg/kg body weight showed an efficacy of 91.93% followed by Fenbendazole (89.09%) and least efficacy by Closantel (59.25%). Artemesia showed efficacy of 34.61% against infection gastrointestinal nematodosis.

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