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# Studies on the Prevalence of Helminth Infestation in Small Ruminants and the Anthelmintic Effectiveness in Tumkur District of Karnataka

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**ABSTRACT:** A study was conducted from March 2014 to February 2015 to determine the prevalence of gastrointestinal (GI) helminth infestations, associated risk factors in sheep and goats and to compare the effectiveness of three anthelmintic drugs in Tumkur district. A total of 390 small ruminant's faecal samples (230 sheep and 160 goats) were collected and examined and faecal egg counts were done using standard parasitological procedures. The study revealed that the overall prevalence of helminthiosis in small ruminants was 48.97% and among sheep and goat, 56.95% and 37.5% respectively. A statistically significant difference ( $p > 0.05$ ) was found in prevalence between sheep and goats. Based on risk factors high prevalence was observed among young, female and poor body conditioned animals. It is evident from the FECR results that, very few eggs were recovered from the animals treated with Ivermectin indicating 98.48% effectiveness followed by Levamisole (96.81%) and Fenbendazole (51.89%). An increasing EPG of faeces from 0 day to 14 days after treatment was noted in infected untreated group.

**KEYWORDS:** Helminth infestation, Anthelmintic effectiveness, Small ruminants, Levamisole and Ivermectin

### I. INTRODUCTION

Tumkur district of Karnataka possesses the livestock population comprise of mainly small ruminants. More number of sheep and goats contributing for the livelihood of poor farmers and provide a vast range of products such as meat, milk, skin, manure etc. Among many causes of reduced production, parasitism is of major importance in many parts of the world and still poses serious threat to the livestock economy worldwide. Helminthiosis in small ruminants is a serious problem in the developing world particularly where nutrition and sanitation is poor. Resistance to anthelmintics has become a major problem these days because of unscientific deworming schedule. Comparative studies on effectiveness of anthelmintic drugs will help to combat resistance, and suitable anthelmintic can be chosen to prevent helminthiosis.

Helminths of small ruminants not only cause heavy economic losses due to poor weight gain and lowered wool production but also delayed maturity, decrease the quality and quantity of mutton and even result in mortality. Development of resistance and tolerance against various anthelmintics has created difficulties in making the choice of the best drug. Periodic evaluation of different anthelmintics in different field conditions is, therefore, essential for devising an effective parasite control programme. So the present study was planned with the below objectives:

- a. To study prevalence of helminth infestation in small ruminants.
- b. To evaluate different anthelmintic effectiveness against helminthic infestation.

### II. RELATED WORK

Helminthiosis in small ruminants is a very serious problem in all developing countries and especially where there is a malnutrition and poor management. Many research works have been done on prevalence studies and anthelmintic

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efficacy in different parts of the world. This will help in proper execution of the control programmes against helminths and also for selection of better anthelmintic.

## III. MATERIALS AND METHODS

The study was conducted to determine the prevalence of GI helminth parasites and to compare the effectiveness of three anthelmintic drugs in Tumkur district of Karnataka. The study animals were all local breeds of small ruminants (sheep= 230 and goat= 160) managed under semi-intensive and extensive husbandry system. Animals were of different age group, up to 6 months age animals were grouped as young and more than 6 months age animals were grouped as adults. Based on body condition animals were grouped as good, medium and poor. There were 107 male and 283 female animals under the study.

Animals with a history of poor growth, pale mucous membranes and rough hair coat were selected by simple random sampling method from different parts of Tumkur district to determine the prevalence of GI helminths of small ruminants based on coprological examination. Age, sex, species and body condition of the animal were considered as risk factors for the occurrence of helminth infections in small ruminants.

### Sample Collection and Examination Procedures:

Faecal samples were collected from 390 small ruminants from different places of Tumkur district (230 sheep and 160 goats) per rectum using gloved fingers, put in labeled polythene covers. The age, body condition, sex and species were recorded. In the laboratory, faecal samples were examined for detection of helminth eggs using standard procedures of direct, flotation and sedimentation methods as prescribed by Soulsby (1982) and eggs per gram of faeces (EPG) was quantified by Mc Master method.

For the trials to determine their effectiveness, the animals with heavy EPG (EPG Range=1580-1670) were allocated into four groups (I, II, III and IV) of ten animals each based on their faecal egg counts. Animals of group I were treated with Fenbendazole @5mg/kg B.W., orally, group II with Levamisole @7.5 g/kg B.W., group III with Ivermectin @200mcg/kg B.W and group IV animals served as untreated control. Post treatment egg counts were done 14 days after anthelmintic therapy by collecting faecal samples from rectum and EPG was done to determine faecal egg count reduction (FECR).

## IV. RESULTS AND DISCUSSION

### Prevalence of GI helminthes:

Out of the total 390 examined faecal samples, 191 (48.97%) were positive for GI helminth eggs in both species of animals. The present study revealed the existence of GI helminth parasites with an overall prevalence of 48.97% in small ruminants. This finding is slightly lower than the previous surveys on sheep and goats (Kumsa *et.al.*, 2011) done in other parts. Furthermore, climate and management system of animals could also contribute in the difference of the prevalence (Regassa *et.al* 2006).

### Prevalence of small ruminant helminthiasis based on risk factors

The prevalence was higher in sheep (56.95%) than goats (37.5%) with a statistical difference. Highest prevalence in sheep when compared to goats probably due to their grazing behavior. Sheep will graze very close to the ground so risk of ingestion of parasitic ova is comparatively more with that of goats, as these will prefer to graze on plants. The identified helminth parasitic eggs were of Strongyle, Fasciola, Amphistome and Moniezia as single and mixed infections in both sheep and goats.

From 230 sheep examined for GIT helminth parasites 58.6% were infected with at least one species of helminth parasite and 50.37% were infected with two or more species. Out of the total 160 examined goats 35.33% were infected with at least one species while 35.84% were infected with two or more species of GI helminthes. In the present study, a higher prevalence of GI helminth parasites was observed in sheep than in goats which is in agreement with the work of Tekly (1991) and Asif *et.al.* (2008).

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The higher prevalence of GI helminth infection was observed in female animals (54.4%) compared to males (34.58%). The difference was statistically significant. It is assumed that sex is a determinant factor influencing prevalence of parasitism (Maqsood *et.al.*1996) and females are more prone to parasitism during pregnancy and pre-parturient period due to stress and decreased immune status.

Among age groups, higher prevalence (57.8%) was observed in young animals than adults (45.83%). Younger animals tend to be more susceptible to helminth infestation as compared to adults. However the difference in prevalence between the two age groups was not statistically significant. A number of authors have demonstrated an increased prevalence in young age Gupta *et.al.* (1976). Asanji and Williams (1987) also stated that young animals are highly susceptible due to immunological immaturity and immunological unresponsiveness. Urquhart *et.al.* (1996), Taswar *et.al.* (2010) and Dagnachew *et.al.* (2011) have documented that adult and old animals develop acquired immunity against helminth infections as they get mature due to repeated exposure and this will help expel the parasite before it establishes itself in the GIT.

In this study, a significant difference was observed in helminth infection in relation to body condition where a higher prevalence of helminthiasis was recorded in poor body condition animals (97.77%) compared to medium (64.28%) and good (35.63%) body conditioned animals. This agrees with Keyyu *et al.* (2006). This poor body condition might be due to malnutrition, other concurrent disease or the current parasitic infection which lead to poor immunological response to infective stage of the parasites.

The coprological investigation in the present study revealed the presence of Strongyle, Fasciola, Amphistome and Monezia eggs, single and mixed infections in both sheep and goats. Among the recorded helminthes, in the current study, the nematodes account the highest followed by trematodes and the least were cestodes. This finding is in agreement with other studies (Kumsa *et.al.*,2011).

The current study has shown the presence of mixed infection characterized by the presence of two or more helminth parasites both in sheep and goats. These mixed infections have been suggested to be an important cause of morbidity and loss of production in sheep and goats (Kumsa *et.al.*,2011). Moreover, the presence of interaction and compromization of the immune system of the host by mixed infections described increase in their susceptibility to other diseases or parasites (Wang *et.al* 2006).

**Table 1: Prevalence of small ruminant helminthiasis based on risk factors**

Risk Factors	No. Examined	No. infected (%)
<b>Species</b>		
Sheep	230	131 (56.95%)
Goat	160	60 (37.5 %)
<b>Sex</b>		
Male	107	37 (34.58%)
Female	283	154 (54.4%)
<b>Age</b>		
Young (Up to 6 month)	102	59 (57.8%)
Adults (>6 months)	288	132 (45.83%)
<b>Body Condition</b>		
Good	261	93 (35.63%)
Medium	84	54 (64.28%)
Poor	45	44 (97.77%)

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## Anthelmintic efficacy results:

It is evident from the FECRT results that, very few eggs were recovered from the animals treated with Ivermectin indicating 98.48% effectiveness, followed by Levamisole (96.81) and Fenbendazole (51.89%). An increasing EPG of faeces from day 0 to 14 Post Treatment was noted in infected untreated group. This increase may be attributed to the development of infective larvae and immature worms to maturity and laying of eggs by them. Significant difference was observed in mean EPG of faeces among groups of animals on different treatments when compared to infected un-treated group (Table. 2).

However, no statistical difference was observed in reduction in EPG of faeces between groups of animals treated with different Levamisole and Ivermectin. The results of present study are almost comparable with those of Tinar et al. (1998), Alam and Samad (1997) and Sissay et.al (2006). In contrast to Ivermectin and Levamisole, Fenbendazole was less efficacious which may probably due to anthelmintic resistance developed among the animals due to repeated use of the same anthelmintic unscientifically. The variation in the effectiveness of different anthelmintics can be attributed to environmental factors, species susceptibility and difference in the level of their exposure in different areas (Sissay *et.al*, 2007).

**Table 2. Percent Faecal egg count reduction (FECR) in treated sheep and goats**

Group	Anthelmintic	No. of animals treated	Fecal egg counts (mean±SE)		FECR % (Anthelmintic Efficacy)
			'0' day	14 days post treatment	
I	Fenbendazole @ 5mg/kg B.W.	10	1651±608	765±132	51.89
II	Levamisole@ 7.5 mg/kg B.W.	10	1608±470	50±17	96.81
III	Ivermectin @ 200mcg/kg B.W.	10	1640±576	25±13	98.48
IV	Untreated control	10	1605±528	1591±429	-

## V. CONCLUSION

The present study showed that helminthiasis of small ruminants is prevalent in the area, and affecting the wellbeing of the animals. Potential risk factors for the occurrence of the disease should be considered in designing strategic anthelmintic treatment. Present study revealed Ivermectin and Levamisole are more efficacious in treating helminthic infestations.

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