A Study on the *in Vitro* Survival of *Oesophagostomum Columbianum* in two different Anthelmintics

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ABSTRACT

The anthelmintics used for the present study were ivermectin and morantel. The parasites *Oesophagostomum columbianum* were collected from the small intestine of sheep slaughtered freshly in local abattoir. The recovered parasites were washed with tap water and then with distilled water thoroughly. After washing the parasites were kept in three different petridishes containing control solution and solution containing ivermectin and morantel respectively. Observations were recorded after intervals of every four hours. It was observed that there was a decrease in survival of worm after exposure with anthelmintics. The worm *Oesophagostomum columbianum* survived for maximum period of 12 and 8 hours in lock-lewis solutions containing ivermectin and morantel respectively whereas their maximum survival in lock-lewis solution was 36 hours. The cent-percent survival was found up to 20 hours but it was reduced after exposure with antiparasitic drugs. The present study could be used to understand the effect of various drugs on the above parasites and other intestinal parasites *in vivo*.

Keywords--- *Oesophagostomum columbianum* *in vitro*, ivermectin and morantel.

I. INTRODUCTION

The nematodes are tiny parasites, but they have potential to cause big repercussions for those within the livestock industry. Nematodes are responsible for various diseases in domestic animals as well as in human beings. Diseases like hyperglycemia, neoplasia, secondary anaemia, elephantiasis and leucocytosis etc. are caused by nematodes in domesticated animals resulting in the poor yield of animal product industries such as milk, meat, medicine, fertilizers, eggs, wool and manure.

Sheeps are important livestock species in developing countries. 65% of the world’s sheep are located in developing countries (FAO, 1984). According to 1982 livestock census, total sheep number in India is 48.8 million. Sheep and goats are important in development because of their ability to convert forages, crops and household residues into meat, fiber, skin and milk. Sheep farming is very popular in the present time due to their economic value.

There is high loss in productivity from disease alone in ruminants, and this recurrent loss and reduction in profit is often due to parasitic infections. SPEACHT (1982) estimated loss due to helminthic parasites throughout the world is almost 30 million sheep and goats. Losses caused by parasites are immense, low quality of meat, decreased milk production and low fertility may be the result of parasitism.

Nematode infections particularly are a common and major problem for sheep industry. *Oesophagostomum columbianum* are very common hookworm parasites of sheep. This parasite inhabits the small intestine of sheep where as *Oesophagostomum columbianum* in large intestine and commonly known as “nodular worm”. Helminth cause considerable economic loss in sheep production and even subclinical infestations can reduce the growth rate of the host (GIBSON, 1963; SOULSBY, 1965).

According to department of Agriculture, the *O. columbianum* cause an annual loss of $ 8343000 in sheep industry in U.S., out of which $2889000 was due to death, $124000 due to morbidity and $233000 due to loss of meat and wool production (LEVINE, 1968).

Besides all these, presence of nematodes also cause malnutrition in hosts, which is one of the major causes of decreased return of products derived from animals. (JELLIFE, 1953; WHO, 1967; TRIPATHY et al., 1971; GUPTA et al., 1977; NASHEIM AND FORSUM, 1980 and STEPHENSON et al. 1980). Since it is known that the efficacy of antiparasitic drugs may decrease with approximately 10 years of use depending on different factors (e.g. development of resistance; PRICHARD 1994; SANGSTER et al. 1985), it is necessary to determine the activity of from time to time Although a good deal of information is now available about anthelmintics and their mode of action but the parasites are still flourishing. There is a great need, therefore, to search new drugs. The designing, formulation and marketing of new anthelmintics require studies regarding various aspects of the action of the anthelmintic not only on the
parasite but also on the host. The in vitro cultivation of nematode parasite is an important tool which might ultimately be used in the study of many aspects of nematode biology, and the elucidation of some of the complex factors which are involved in the host-parasite relationship (Paul and Jones 1956).

*O. columbianum* is an intra-intestinal parasite and feed on mucous membrane and hence the anthelmintic also affect the cuticle, hypodermis and intestine and such effects need further researches. Although a good deal of information is now available about anthelmintics and their mode of action but the parasites are still flourishing. There is a great need, therefore, to search new drugs. The designing, formulation and marketing of new anthelmintics require studies regarding various aspects of the action of the anthelmintic not only on the parasite but also on the host. In the present work we have studied the in vitro effect of ivermectin and morantel on cuticle and other organs of the *O. columbianum.*

## II. MATERIALS AND METHODS

The parasites used in the study were collected from large intestine of sheep slaughtered freshly in local abattoir. After removing from the intestine, the parasites were washed with saline water thoroughly. To study the effect of morantel and ivermectin three groups A, B and C were made.

In group A, ten parasites (*O. columbianum*) of mixed distribution were kept in petridish containing lock-lewis solution for control. In group B, ten parasites (*O. columbianum*) of mixed distribution were kept in petridish containing lock-lewis solution with ivermentin in 50 µg/ml concentration. In group C, ten parasites (*O.columbianum*) of mixed distribution were kept in a petridish containing lock-lewis solution with morantel in 50 µg/ml concentration.

All the petridishes were kept at 37°C for incubation. All the petridishes were kept at 37°C for incubation and observations were taken after every four hours.

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<tr>
<th>Time in Hours</th>
<th>Lock-Lewis Solution</th>
<th>Lock-Lewis Solution with Ivermectin</th>
<th>Lock- Lewis Solution with Morantel</th>
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## III. DISCUSSION & CONCLUSION

Several physiological solutions are reported in which nematodes can survive for long periods, even outside the host. Fleig medium was reported best medium.
for support of immature and mature S. cervi (GUPTA et al., 1982). Lock-Lewis solution was reported most suited physiological solution for survival of Procamallonus and Protospirura (LAL & MITTAL 1978). Largest survival of A. galli was observed in 0.8-0.9 percent sodium chloride (NaCl) solution (NARAIN, 1973). In the present study the maximum survival O. columbianum in Lock-lewis solution was observed 36 hours. MAGNATH (1919) reported the maximum period of survival for Camallanus americans, which lived about 2 months. The Osterlagia circumcinata lived for about 2 days in 0.9 percent sodium chloride solution. (DAVEY, 1938 AND WEINLAND, 1901). A. lumbricoides could live for 35 days in sodium chloride solution, the addition of sodium carbonate did not make to 7-9 days (DAVEY 1938 AND WEINLAND, 1901).

Intestinal nematodes are subjected to appreciable osmotic variations in the medium (PROSSER, 1961), and appeared to be capable of adjustment to varying osmolarity. Maximum survival of O. columbianum was observed 36 hrs the present studies. Survival studies also help to see the in vitro effect of anthelmintics. Investigations were carried out to observe the effect of anthelmintics (Ivermectin and Morantel) in vitro survival of Oesophagostomum columbianum at 50 µg/ml concentrations. It was observed that there was a decrease in survival of worm after exposure with anthelmintics. The worm Oesophagostomum columbianum survived for maximum period of 12 and 8 hours in lock-lewis solutions containing ivermectin and morantel respectively whereas their maximum survival in lock-lewis solution was 36 hours. The cent- percent survival was found up to 20 hours but it was reduced after exposure with antiparasitic drugs.

The results of the experiment in the present invitro study (survival test, drug uptake time dependence, dose dependence and comparison with other drugs) has increased our knowledge and will make it easier to propose the optimum application of ivermectin and morantel

REFERENCES