On Morphology and Morphometry of *Trichuris ovis* Abildgaard, 1795 Recovered from Ruminants of Ladakh, India

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Abstract: Morphology and morphometry is used as tools for parasite identification since times immemorial, however this trend has been no longer used since the last decades and the identification became dependent on molecular characterization. However, this is possible in developed Countries while as the developing and underdeveloped Countries, like India, still largely depend on the traditional techniques. In this investigation an attempt was made to study the morphology and morphometry of adult Trichuris ovis recovered from caecum of the ruminants in Ladakh in order to access the effect of the study area, host, intensity, age, sex of the host and methodology on morphology of the parasite. It has been found that all these factors pose a little effect on the parasite identification were of minor importance because they were found within the range of similarity and were not good enough to label it as a new species as was expected. However, some descriptive features might be helpful in the parasite identification.

Keywords: Morphology, Morphometry, *Trichuris ovis*, Ruminants, Ladakh.

INTRODUCTION

Trichuris ovis is one among the most prevalent nematode parasites infesting the caecum of ruminants irrespective of age, gender, and breed of the host worldwide leading to considerable loss in variety of ways. Several attempts have been done to study this parasite by different researchers [1-10] from time to time in order to gain more and more knowledge regarding this parasite for an effective treatment. After a century of research into their biology and control, this parasite continues to be an important constraint on ruminant production. Modern anthelmintics, together with an understanding of the morphology and epidemiology of parasitism, the immune response and nutritional requirements of ruminants, currently enable satisfactory management of the problem. However, the increasing incidence of resistance by the parasite to available anthelmintics is challenging task for producers to maintain high levels of productivity in livestock industry. Novel developments for the management of nematode parasites such as vaccines, biological anthelmintics, genetic markers and selective breeding may, in the future, provide additional or alternative means of parasite control. However, such alternative control methods are likely to be more dependent on a sound understanding of the species, lifecycle and population dynamics of the parasites involved and the epidemiology of disease they cause than current methods that rely heavily on broad-spectrum anthelmintics. Despite the immense progress made to control parasitosis, people of Ladakh continue to incur significant losses due to insufficient availability of information and aid regarding helminthosis as only little work has been carried in this region [11, 12]. Keeping the same in view the present study was taken into consideration.

MATERIALS AND METHODS

Different parts of the study area were surveyed and a number of gastrointestinal tracts of different slaughtered ruminants were collected from different slaughter houses. The various organs were separated from each other, placed individually in shallow plastic jars containing normal saline (0.85%) and were examined for helminth parasites followed by standard methods of Boomker *et al.* [13]. The digestive tract was divided into rumen and reticulum, omasum and abomasa, small and large intestines. The rumen and reticulum were opened and their contents carefully removed. Visible parasites were collected in plastic jar containing normal saline. The abomasa, the small and large intestines were opened. Each organ was rinsed twice in a small quantity of water, which was added to the respective ingesta. The washed organs were retained for further processing. The ingesta from each part of gastrointestinal tract was thoroughly mixed separately, put in plastic jar with one liter capacity and preserved in 10% formalin for further processing in the laboratory.

In the laboratory, the contents of the abomasa, small and large intestine were put into separate plastic containers of two liters capacity and each was made up to 1000ml with water. Using a glass pipette the contents were thoroughly mixed and $1/10^{th}$ aliquot (100ml) was taken. The digest of abomasa and small

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intestine were sieved through a sieve with 25 µm mesh size and those of large intestines over a sieve with 90 µm mesh size. The various aliquots of the ingesta and the entire digests were taken into petridishes and were examined under the microscope for parasites. The parasites after their recovery from the hosts were washed in normal saline to free them from mucus. Then they were fixed in hot 70% alcohol after fixation the nematode parasites were preserved in glycerin alcohol. (Glycerin: 70% alcohol, 1:3) and were mounted in glycerin and glycerin jelly. Faecal samples were collected in collection tubes containing 10% formalin and were examined by direct smear, flotation and sedimentation techniques for the presence of eggs [14]. The drawings of the parasites or parts of parasites were made with the help of prism type camera lucida and the measurements were made with the help of Objective (stage) micrometer only and Objective and Ocular micrometer. Photographs of the permanent mounts were taken with the help of Olympus Digital Camera under Olympus CX21 microscope. Identification of adult parasites as well as eggs was done on the basis of various morphological and morphometric characters [1, 15-17].

Study Area

Ladakh (the only cold desert of the world) constitutes one among the three main regions of the Jammu & Kashmir State which lies between 32.17 and 36.58 North latitudes and 73.26 and 80.26 East longitudes. This region falls under the districts of Kargil and Leh, the later lies at a comparatively higher level around 3800-5,900 meters from the sea level as compared to the former 2900-4500. The most striking feature of Ladakh region is the mountain ranges that stretch from the southeast to the northeast. Although most of Ladakh is mountainous, yet there are many valleys lying in the lap of the mountain ranges such as the Great Himalayan range, the Zanskar range, the Ladakh range and the Karakoram Range. As like all other high altitude mountainous region, Ladakh is sparsely populated (*ca.*1,50,000) *i.e*., only two persons per square kilometer. Although life is difficult at high altitudes yet both man and other animals survive here comfortably as revealed by the diversity of animals [12].

RESULTS AND DISCUSSION

During the present study a large number of parasites identified as *T. ovis* were recovered from both small and large ruminants of Ladakh. A detailed study on morphology and morphometry of the parasite was conducted in order to gain more and more knowledge and to find out the effect of the locality and host species on the morphology of this parasite as given below.

General Description

Comparative characteristics (measurements in mm) have been given in Table **1**. The parasites are of light yellow colour. Body is filiform with narrow anterior end and thicker posterior. The mouth is a simple opening, lacking lips. The buccal cavity is tiny and is provided with a minute spear. The esophagus is very long, occupying about two third of the body length, and consists of a thin walled-tube surrounded by large, unicellular glands, the stichocytes.

Table 1: Comparative Characteristics (Measurements in mm) of *Trichuris ovis* Abildgaard, 1795

Particulars	Andrews (1969)	Soulsby (1982)	Schimidt (1986)	Aysha (2008)	Present Specimens
Total length	46-56 (M) 47-75(F)	50-80 (M) 35-70 (F)	45(M) 50 (F)	40-78	64.06 (53.04-75.08) (M) 51.11 (32.03-70.19) (F)
Max. Width	.....	.....	.....	…….	0.55 (0.37-0.74) 0.46 (0.30-0.62)
Esophagus	.....	.....	.....	……..	8.25 (7.13-9.37)
Spicule	4.0-6.0	5-6	4-6	4-6	5.40 (4.18-5.62)
Egg Size	0.080X0.030	70-80X30-42 µ	65-82X30-45µ	0.06-0.07x0.03-0.04	0.076X0.040 (0.070-0.082X0.034-0.046)
Host	Wild ruminants	Domestic animals	Domestic animals	Sheep	Ruminants
Locality	Newzeland	London	Florida	Jammu	Ladakh

Male

Body 32.03-70.14 mm in length, 0.30-0.62 mm in width across stout posterior part. Posterior end bearing single spicule (4.18-5.62 mm), latter slightly proximally expanded, pointed at distal end; spicule sheath bearing slightly stretched globular expansion at its distal end; sheath covered with closely set spines, those on distal expansion of sheath larger than the rest.

Female

Body 53.04-70.14 mm in length, 0.37-0.74 mm in width in posterior one-fourth part. Vulva opening at junction of anterior esophageal and posterior stout reproductive portions. Esophagus measures 7.13-9.12 mm Vagina long, slender; its lumen widening gradually posteriorly; lumen of distal portion lined with small spines for a little distance. Eggs barrel shaped with polar plugs; latter do not project well beyond the proteinous coat. Eggs are 0.070-0.082X0.034-0.046 mm in diameter.

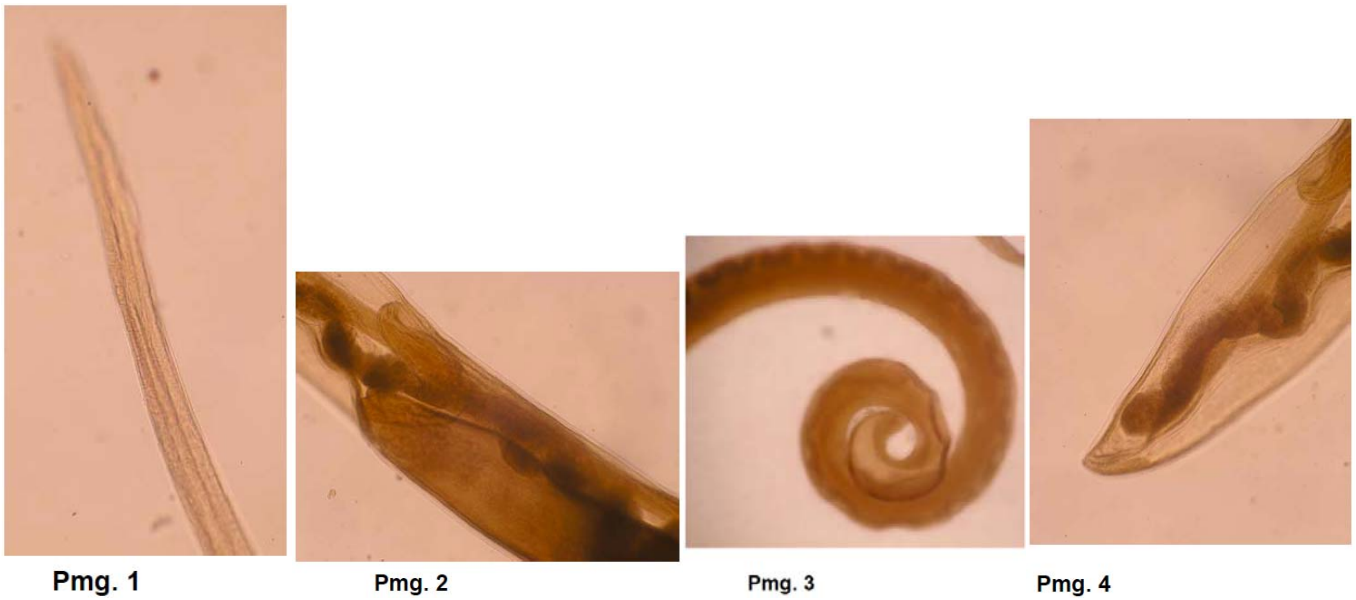
Location: Caecum

Host: Goat, Sheep, Cattle and buffalo

Locality: Ladakh

REMARKS

T. ovis and *T. globulosa* has been differentiated by Baylis [18] on the basis of the size of the spines on the distal expansion of the everted spicule sheath (those on the distal expansion of the sheath being larger than the rest in *T. globulosa* and vice versa in *T. ovis*) and by the topography of vagina (long and slender with its lumen widening gradually in *T. ovis*, whereas short and stout with its lumen forming angular bends and opening suddenly into an egg chamber in *T. globulosa*). However, no size difference was observed in the spines of the spicule sheath in the male specimens of *T. ovis* examined herein. The males of the two species could be differentiated with reference to the shape of the proximal end of the spicules and also of the distal expansion of the everted spicule sheath. Further, no cuticular inflation was noticed near the head end as recorded by Farleigh [19]. From the existing species of genus *Trichuris* Roederer, 1761, the present specimens were found to be very close to the description of *Trichuris ovis* as given by [1, 15-17] as regards its morphological characters including the total length, maximum breadth, size of spicule, vulvular region, anterior end, etc. However some intraspecific variations in size ratio have been recorded in the present specimens, which are of minor taxonomic



Pmg. 1 Pmg. 2 Pmg. 3 Pmg. 4

Pmgs 1-4: *Trichuris ovis* (Abildgard, 1795) Smith, 1908.

(1) Anterior end of male.

(2) Middle portion of female.

(3) Posterior end of Male.

(4) Posterior end of Female.

importance. It is therefore assigned to *Trichuris ovis*. This is the first report of this species from this region.

CONCLUSION

It is clear from the study that ruminants of Ladakh make no exception from the rest of world regarding *Trichuris ovis* infection. However study area, intensity, methodology, age and sex of the host as well as parasite has an effect on the morphology and morphometry of the parasite which could sometimes create a confusion regarding the identification of the species. Therefore it is believed that the present study will be of some use to avoid this confusion regarding identification of this parasite.

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