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Research Article

First Report of Helminth Parasites of Walia Ibex (*Capra walie*) at Simen Mountains National Park, Natural World Heritage Site, Northern Ethiopia

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Abstract: Walia ibex (*Capra walie)* is critically endangered ungulate which is found in the Simen Mountains National Park (SMNP), northern Ethiopia. This study was conducted from February to August, 2011to determine the prevalence of helminth parasites of this animal. A total 167 faecal samples were collected and examined by floatation, sedimentation and Baermann techniques. The overall prevalence of helminth infection was 85.63% (143/167). Of this, 85.03% were nematodes and 7.18% cestodes. The eggs of trematode species (spp) were not encountered. The helminth parasites detected were strongyle spp. (78.44%), *Nematodirus* spp. (14.97%), *Moniezia* spp. (7.19%), *Strongyloides* spp. (5.39%), *Trichuris* spp. (4.19%), *Ascaris* spp (2.99%) and lungworms (26.35%). The genera of lungworms encountered were *Dictyocaulus*, *Muellerius* and *Protostrongylus*. Of all positive animals, 78.43% were infected with two or more type of parasites whereas 11.76% were harbouring only one parasitic species. The present results indicated that the infections caused by helminth pasites are significantly common in Walia ibex which necessitates further studies to design appropriate worm control strategies.

Keywords: Ethiopia, helminths, prevalence, SMNP, walia ibex

INTRODUCTION

Parasites and infectious diseases of wildlife are a major threat to conservation of endangered species (Lyles and Dobson, 1993; Gebremedhin *et al.*, 2009). Thus, there is a great need for studying and documenting the prevalence of parasites among endangered species. Transmission of pathogens at the wildlife-livestock interface can occur in both directions and may therefore pose a threat to either agriculture or conservation (Bengis *et al*., 2002).

Most free-living organisms harbour parasites of several species (Begon and Bowers, 1995), which can adversely affect their health, fecundity and foraging and may also modify host behaviour to facilitate parasite transmission. Parasitism has been shown to affect both the evolution and ecology of hosts through processes such as sexual selection or parasite-mediated competition, which can lead to a reduction in population size, or the extinction of the host (Price *et al*., 1986; Hoberg *et al*., 2001).

From a conservation point of view, parasitological studies are important to understand ways of infection and the potential transmission of parasites between species, both native and introduced (Begon *et al*., 1999). In order to assess and manage the effect of parasites on population dynamics, it is also essential to evaluate their incidence and prevalence (Morner, 2002; Williams *et al*., 2002; Junge and Louis 2005a, b).

The Simen Mountains National Park (SMNP) is the home to a number of threatened and endemic species of wildlife like Walia ibex (*Capra walie*) which is considered as critically endangered species (IUCN, 2008). The animal is important not only from conservation point of view but also it has enormous economic importance as many domestic and international tourists are coming to visit the park. Despite its importance the animal is vulnerable to human disturbances such as habitat loss, illegal hunting and diseases (Gebremedhin *et al*., 2009). In domestic animals helminth parasites are creating great problems in the country by causing mortality and morbidity (Tembely *et al*., 1997; Abebe and Esayas, 2001; Biffa *et al*., 2006). The issue is not well addressed in wildlife especially in Walia ibex, locally endemic to SMNP, the flagship mammal in Ethiopia. Therefore, this study was designed to determine the prevalence of helminth parasites in Walia ibex at SMNP, northern Ethiopia.

MATERIALS AND METHODS

Study area: The study was conducted at Simen Mountains National Park (SMNP), Amhara Regional State and northern Ethiopia. The SMNP is located at the northern edge of the central plateau of Ethiopia, about 123 km from Gondar town and about 885 km from Addis Ababa. The park covers a total area of 412 km^2

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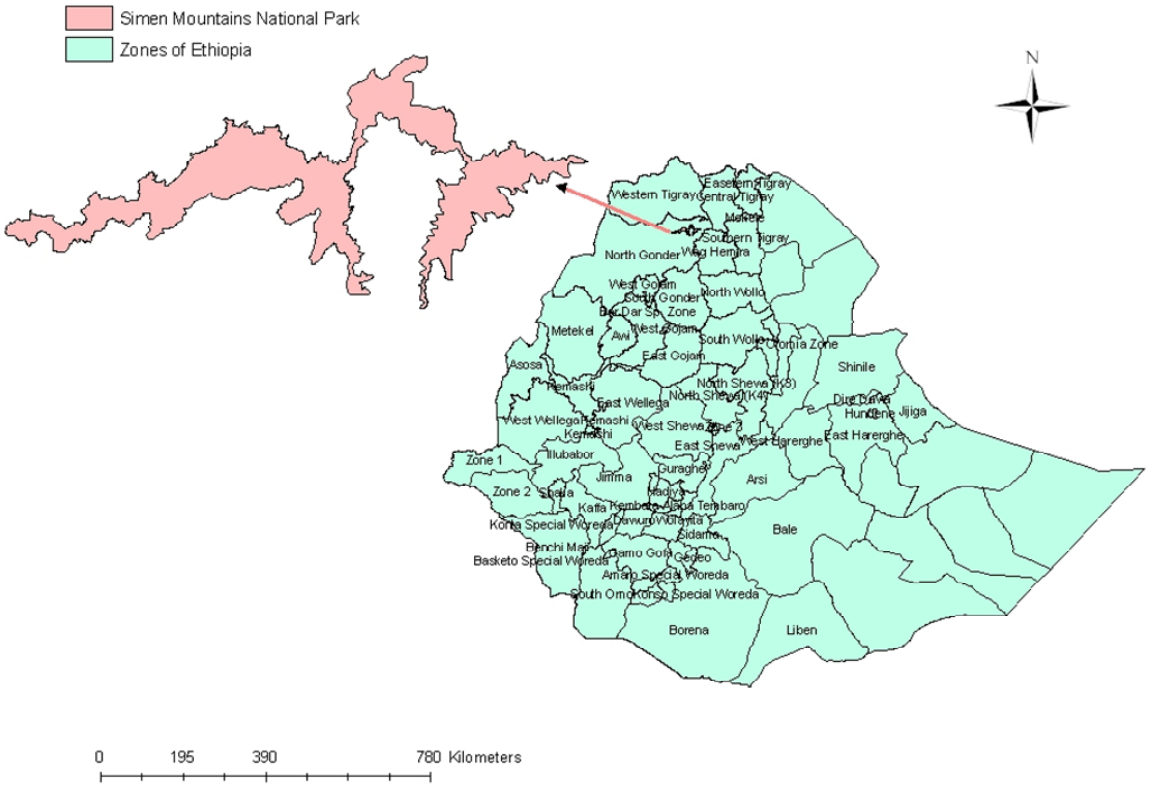

Fig. 1: The map that depicts the location of the study area (SMNP Office, 2010)

and lies between 13° 9'N latitude and 38° 15'E longitude.

The Simen Mountains Massif is one of the major highlands of Africa, rising to the highest point in Ethiopia, Ras Dejen (4,620 m), which is the fourth highest peak in the continent. Although in Africa and not too far from the equator, snow and ice appear on the highest points and night temperatures often fall below zero. The park has spectacular views and a large variety of wildlife, including *Gelada baboons*, *Walia Ibexes*, *Ethiopian wolves* and birds of prey such as the rare *lammergeyer*, a huge vulture. The park was created primarily to protect the *Walia Ibex*, a type of wild goat and over 750 are said to live in the park (Fig. 1) (SMNP Office, 2010).

Study animals: The study animals were Walia ibex at SMNP. Each group or herd of Walia ibex at each grazing site was composed of different age and sex groups.

Study design: The study design was a cross-sectional based on parasitological surveys. Simple random sampling technique was used to collect samples from the recently defecated faeces.

Sampling procedure: When a group of Walia ibex was observed, watched for some time and after they vacated that area; the area was searched for fresh faecal samples. In these instances, only faecal pellet groups judged to be from the particular species under observation were collected and only pellet groups at least 50 cm or more apart were considered to be independent samples. The maximum number of samples collected during this type of sampling never exceeded the number of individuals in the group so as to reduce the probability of any single individual being sampled more than once. To ensure adequate sampling of host groups, whenever possible, at least 20 faecal samples from groups that exceeded 20 individuals and at least 10 samples from groups of less than 20 individuals were collected, based on results of sampling studies of domestic ungulates that suggest that between10 and 20 faecal samples provide a reliable assessment of herd infection rates (Gasbarre *et al*., 1996). All fresh faecal samples were taken from the ground with strict sanitation using gloved hands and placed in sterile sample bottles, labelled and transported in ice box to Parasitology Laboratory of Faculty of Veterinary Medicine, University of Gondar where they were stored at 4°C until processed. Over the course of the entire study, a total of 167 faecal samples were collected. The sedimentation, floatation and Baermann technique as described by Urquhart *et al*. (2003) were used to detect the presence of eggs and larvae of helminths in the samples. Parasite eggs and larvae were microscopically (10x and 40x) identified by colour, shape and contents (Urquhart *et al*., 2003). No attempt

Table 1: Prevalence of GI helminths based on eggs /larvae detection in faecal samples of Walia ibex (n = 167)

Genera of parasites	No positives	Percentage
Strongyle-type	131	78.44
Lungworms	44	26.35
Nematodirus species	25	14.97
Moniezia species	12	7.19
Strongyloides species	9	5.39
Trichuris species	7	4.19
Ascaris species	5	2.99

was made to differentiate between eggs of different strongyle species but all other helminth eggs were identified to genus level.

Data analysis: The data collected during sampling and laboratory results were entered in Microsoft-excel spread sheet. The prevalence was calculated by dividing the number of infected individuals with the number of individual sampled and multiplied by 100.

RESULTS

The prevalence of faecal pellets containing helminth eggs was 85.63% for the 167 groups of faecal pellets collected. Out of these, 142 (85.03%) presented nematodes and 12 (7.19%) cestodes (*Moniezia*) as single and mixed infections. The most prevalent helminth parasites detected were strongyles with a prevalence of 78.44%. The second most prevalent genus recovered was *lungworms*, at 26.35%, followed by *Nematodirus spp* (14.97%) (Table 1). The lungworms genera found were *Dictyocaulus*, *Muellerius* and *Protostrongylus*. No eggs from trematodes were recorded.

Multiple parasitic infections were common and up to six different parasite species were found in the same faecal pellet. Parasitism involving only one species was found in 11.76% (18/153) of the samples and two or more species in 78.43 % (120/153). Majority of samples contained either 2 or 3 parasite types, while only a few samples had 4 or 5 different parasite types. The most frequent cases of multiple parasitisms were formed among nematodes.

DISCUSSION

The present study showed that Walia ibex in SMNP is a host to a range of helminth parasites which include nematodes and cestodes as mixed or single infections. Strongyles, *Nematodirus*, *Strongyloides*, *Trichuris*, *Ascaris*, lungworms and *Moniezia* were among the prevalent helminths in the animal. The presence of these parasites in the host may induce morbidity and even mortality as well as they can also be the reservoir of parasites for other domestic or wild mammals. However, the effects of these parasites on the host and their ability to establish themselves in any other animals have to be thoroughly investigated. Identification of these parasites to species level or molecular characterization may reveal parasites which are specifically affecting Walia or commonly shared with other ungulates. Presence of lungworms in the lung of the host induces parasitic pneumonia which may impair their respiratory function (Malone, 2000) and predisposes the animal for other infections. Different lungworm species and their effects were well studied and reported elsewhere in the country in sheep and goats (Tembely *et al*., 1997; Regassa *et al*., 2010) which are biologically related with Walia ibex. The lack of trematodes in the current study provides evidence to back up the rarity of infection by this class of parasites. For the establishment of trematodes to a given environment, availability of suitable snail habitat and suitable climatic conditions are needed (Urquhart *et al*., 2003). These conditions might not be fulfilled in the park as the temperature usually fall below zero especially at night.

Different studies have been conducted to describe the occurrence of helminth infections in other wild animals like antelopes and gazelles. *Nematodirus* spp, *Haemonchus contortus*, *Ostertagia* spp, *Trichostrongylus* spp and *Trichuris* spp were most commonly mentioned as parasites of wild ungulates (Church, 1986; Kock, 1986; Flach and Sewell, 1987). Hoberg *et al.* (2001) also reported detail list of parasites that affect wild animals in North America.

This is the first study about the helminth parasites affecting Walia ibex in SMNP, so lack of previous surveys; create difficulty in comparing and contrasting of the results obtained in the current investigation with others.

CONCLUSION

The result of this study indicated high prevalence of helminth parasites in Walia ibex which underlines the need for further studies that may help to design appropriate strategies to control these parasites. It is possible that Walia ibex with gastrointestinal parasites can serve as a source of infection for other forest-dwelling species, as well as domestic livestock and humans. In general, the management of diseases that threats this endangered species needs to consider helminthic parasites as an integral component of the overall conservation plan.

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