



Prevalence and Risk Factors of Theileriosis in Goat and Sheep in Lahore

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Abstract

In Pakistan, theileriosis is a common hemoparasitic disease in small ruminants. In order to establish the prevalence of theileriosis in Lahore, Pakistan, a total of n=730 animals were chosen. n = 103 (14.11%) of the samples tested positive for theileria under a microscope. Theileria spp. was found to be present in 10.73% of goats (44/410) and 18.44% of sheep (59/320), respectively. Theileria infection in goats was unaffected by age, sex, or season (P > 0.05). Age and season had an effect on the prevalence of theileriosis in sheep (P < 0.05), with a gender trend. To determine the effect of the risk variables on sheep and goats, more prevalence studies are needed.

Keywords: Theileria; Sheep; Goat; Prevalence; Risk Factors

Introduction

Theileria lestoquardi (hirsi), *T. ovis* (recondita), and *T. separate* cause ovine theileriosis, an economically important illness of small ruminants in the tropics and subtropics [1-3]. Malignant theileriosis in sheep and goats is caused by *Theileria lestoquardi*, a severe lymphoproliferative disease with substantial mortality and morbidity [4,5]. *T. lestoquardi* causes fever, lymphadenopathy, wasting, anaemia, and jaundice when transmitted by ticks of the Ixodidae family. The acute type of the condition is the most common, although there are also subacute and chronic forms. The illness is enzootic from North Africa to India via the Middle East [3,6,7]. In Pakistan, the primary tickborne haemoparasitic illnesses of cattle and small ruminants are babesiosis and theileriosis [8]. Theileriosis (*T. annulata*) in cattle has been thoroughly investigated; however, little is known about

ovine theileriosis in small ruminants in Pakistan. Clinical signs and microscopic inspection of blood smears are the most common ways to diagnose theileriosis. As a result, the purpose of this study was to establish the prevalence of Theileria in goats and sheep in and around Lahore, as well as the many risk factors that contribute to disease occurrence.

Materials and Methods

A total of n= 730 animals (n=410 goats and n=320 sheep) were chosen from herds in and around Lahore and transported to the UVAS Lahore Veterinary Hospital, for treatment. The research took place between August 2020 and July 2021. The animals were checked clinically, and blood samples were examined microscopically to detect the prevalence of theileria in stained smears. Ticks were meticulously searched throughout each animal's body. A

blood sample was taken from each animal's ear vein. A thin blood smear was made on a grease-free glass slide, air-dried, fixed in methanol for 2–3 minutes, and stained for 30 minutes with Giemsa at a dilution of 5% in PBS. Based on morphology, the stained smears were examined using an oil-immersion lens (100x) for the presence of theileria [9-11]. Age, gender, season, and clinical symptoms were used to sort the data. The data was divided into two categories based on age (less than 6 months and more than 6 months), sex (male and female), species (sheep and goat), and tick infestation (less than 6 months and more than 6 months) (presence or absence). Seasonal data was separated into four categories: dry hot, wet hot, winter, and spring). The Chi square test was used to investigate the relationship between the presence

of theileria (positive and negative blood samples) and other risk factors (SPSS, Inc, USA). At $P > 0.05$, the likelihood of significance was predetermined.

Results and Discussion

The presence of *Theileria spp.* was tested in a total of $n=730$ blood samples ($n=410$ from goats and $n=320$ from sheep). Blood smears were obtained and stained with Giemsa, and the existence of piroplasms in the infected animals' erythrocytes was investigated under light microscopy. *Theileria spp.* was found to be present in 10.73 % of goats and 18.44 % of sheep, respectively (Table 1).

Species	Total Sample	No of Positive	Prevalence (%)
Goat	410	44	10.73
Sheep	320	59	18.44
Total	730	103	14.11

Table 1: Prevalence of Theileria in goat and sheep.

The parasite prevalence was higher in sheep than in goats, which could be attributed to the nature of their skin. Sheep were shown to be more vulnerable to *T. ovis* than goats [12]. Because of the nature of sheep's skin, this parasite has a greater prevalence rate. In comparison to sheep, goats have

thin skin that appears to be more resistant to ticks. Ticks can easily become entangled in sheep's wool, resulting in an infestation. The fact that no theileria was identified in animals that were devoid of ticks also supports this notion (Table 2).

Species	Category	Total Sample	No of Positive	Prevalence (%)
Goat	Positive	381	44	11.55
	Negative	29	0	0
Sheep	Positive	276	59	21.38
	Negative	44	0	0

Table 2: Prevalence of Theileria based on Tick infestation.

The prevalence of theileriosis in sheep was higher (18.44%) in this study than in a previous study by Rehman, et al. [13], who found a 16.5% prevalence of theileriosis in the District Okara. This disparity could be attributed to the fact that the two districts are located in different parts of the

country. Durrani, et al. [11] also discovered that the incidence of theileria in sheep was affected by the geographical distribution of animals. In the current investigation, a link between gender (Table 3) and age (Table 4) was discovered.

Species	Sex	Total Sample	No of Positive	Prevalence (%)
Goat	Male	170	15	8.82
	Female	240	29	12.08
Sheep	Male	170	37	21.76
	Female	150	22	14.67

Table 3: Prevalence of Theileria based on sex.

Species	Season	Total Sample	No of Positive	Prevalence (%)
Goat	Dry Hot	120	12	10
	Wet Hot	102	14	13.73
	Winter	78	7	8.97
	Spring	110	11	10
Sheep	Dry Hot	81	18	22.22
	Wet Hot	102	25	24.51
	Winter	64	5	7.81
	Spring	73	11	15.07

Table 4: Prevalence of Theileria based on Season.

On the other hand, found no correlation between gender and age and the prevalence of theileria in sheep and goats Table. In the current study, the overall prevalence rate in both sheep and goats was found to be 14.11% (Table 1). In the same geographical area, Durrani, et al. [14] found 22% and 35% prevalence by microscopic examination and PCR, respectively. Season has been identified as one of the major risk factors influencing the parasite's prevalence. Summer and spring seasons are key risk factors for the incidence of *Theileria spp.* in sheep and goats, according to our findings (Table 4). During different seasons of the year, the prevalence of *Theileria spp.* varied. During the winter season, the prevalence was low in goats 8.97% and sheep 7.81% (Table 4). Tick infestation rate is impacted by temperature, rainfall, and relative humidity, thus the rise in prevalence during hot seasons could be due to this Gosh, et al. [15-17]. The

incidence of theileria in sheep was found to be influenced by age and sex in the current investigation. Tick infestation was revealed to be a risk factor for the emergence of this parasite solely in goats. It's possible that the lack of ticks as a risk factor is due to a low number of positive samples. In goats, the parasite was distributed similarly ($p > 0.05$) in kids and adults, although it was greater ($p > 0.05$) in youngsters than adult sheep. In sheep, the prevalence of parasites was higher in males than females, whereas gender was not determined to be a risk factor in goats. Rehman, et al. [13] found a prevalence of 15.8 % and 16.6 % of *Theileria spp.* in male and female sheep, respectively. Transfer of maternal immunity to lambs could explain the low incidence of these parasites in lambs under six months of age. In goats, this impact was not detected (Table 5).

Species	Age	Total Sample	No of Positive	Prevalence (%)
Goat	< 6 months	183	16	8.74
	> 6 Months	227	28	12.33
Sheep	< 6 months	135	18	13.33
	> 6 Months	185	41	22.16

Table 5: Prevalence of Theileria based on Age.

In comparison to humans Jianxung and Hong [1] found a greater prevalence rate (78-85 %) in lambs. Pyrexia, emaciation, dyspnea, and swelling of the superficial lymph nodes were detected in the animals in the current investigation.

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