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Seasonal Dynamics of Haemonchosis in Sheep and Goats in Tiruchirappalli District, India

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A B S T R A C T

An epidemiological study was carried out from October 2016 to April 2017 in order to establish the epidemiology of *Haemonchus contortus* infections in small ruminants of Tiruchirappalli district. A total of 700 faecal samples were collected from randomly selected sheep and goats, and has been examined using standard coprological techniques. An examination of the conjunctiva's colour has been associated with parasitic diagnosis to assess the degree of anaemia in animals. The study disclosed an endemic evolution of haemonchosis in the study region. The overall prevalence was of 335 (47.85%) with a mean eggs per gram of faeces (EPG) of 310 per infested animal. No significant influence could be attributed to host's species or age. The season has been a major significant variation factor, wherein the prevalence of haemonchosis was higher in wet seasons (67.00%) than in dry (33.50 %). Elsewhere, a strong correlation was found between the conjunctiva colour and the worm burden but with a reverse influence of the season. In rainy seasons, degrees of anaemia have been low even though the intensity of infection was high. Inversely, moderate EPG levels induced detectable anaemia during dry seasons.

Introduction

Sheep and goats productions involve small holders living under poor conditions (traditional system with mainly family farms). The sector receives little support and is hampered by various constraints including feeding, health problem and gastrointestinal parasitism. Gastrointestinal parasitic infections in sheep and goats are major constraints in small ruminant's production system and it is an important cause of death. Environmental factors play a vital role in the parasitic infections.

For controlling gastrointestinal parasitism, information about the epizootiology of gastrointestinal parasites on a regional basis is important.

Among the gastrointestinal nematode infections in sheep and goats *Haemonchus contortus* has been found predominant throughout the world and also found as most pathogenic nematode. In the study region, there is very limited available information on this parasite. Thus, the parasitic risk is often underestimated or mismanaged in practice.

Consequently, rural populations are unduly burdened by poverty while their activities may be better capitalized. This study aims to determine the prevalence and seasonal variations of haemonchosis in sheep and goats in order to propose an appropriate management plan against this impoverishing parasite.

Materials and methods

Study area and duration

The study was conducted in sheep and goats of Tiruchirappalli district, Tamilnadu (India) during October 2016 to April 2017.

Study animals

A total of 700 small ruminants including 350 sheep and 350 goats were considered during the study which includes apparently healthy and clinically affected sheep and goat of organized and unorganized farms located in the study region including government farms, constituting Two groups of ages, young (< 1 year) and adult (> 1 year). Animals were identified by an individual number and some of their characteristics (species, origin, age, sex and general condition) are recorded.

Study methodology

Collection of samples and data

A total of 700 small ruminant's rectal faecal samples were collected manually in suitable containers and labeled carefully. Climatic condition of the farm area like temperature, rainfall and relative humidity were recorded and the required meteorological data like average minimum and maximum temperature, relative humidity and rainfall were taken from the government meteorological station every month.

Clinical examination

The colour of each animal's conjunctiva were examined and characterized.

Three levels of colour (red = no anaemia, pale = anaemia and white = severe anaemia) have been defined and used on the basis of the FAMACHA system.

Parasitological examination

The eggs per gram of faeces (EPG) for *Haemonchus contortus* were estimated by the modified McMaster techniques.

Gastrointestinal nematode larvae were identified after culture of the faecal samples at room temperature for 7 days.

Results and Discussion

Prevalence of anaemia

Anaemia was detected in 204 animals out of 700 examined (29.14%) and almost 7% (45) were severely affected.

The anaemia test seemed reliable since the colour of the conjunctiva has been strongly correlated with the worm EPG levels.

Overall and seasonal prevalence of *H. contortus* infection in sheep and goats

Overall, (47.85%) of the examined animals (335 out of 700) were infested by *H. contortus*. The seasonal trend of infection shows that haemonchosis is endemic in all areas without significant differences according to species or origins. The minimum and maximum recorded infection rate was (24.00%) in April (a very dry month) and (72.00%) in October (a very wet month) respectively (Table 3).

Variation factors of *H. contortus* infection rates

Statistically, only the season was significantly associated with the haemonchosis rates during the study. Haemonchosis has been more frequent in wet season (72.00%) than in dry (24.00%). There was no significant difference relating to species, sex or age (Table 1).

EPG levels of *H. contortus* and anaemic condition

The mean EPG levels of *H. contortus* were about 310. It was strongly correlated with the season. Whatever the study area, the intensity of infection was higher in wet than dry seasons. Among 204 animals classified in the anaemic groups, 204 (82.35%) were really infected with *Haemonchus contortus*. Moreover, only (35.88%) of non-anaemic animals were positive to *Haemonchosis*. Considering that the anaemia test used is reliable, *Haemonchosis* has been a main cause of anaemia in the examined animals (Table 1 and 2). A correlation has generally prevailed between the EPG levels and the degree of anaemia with a reverse influence of the season. In dry seasons, even moderate infestations increased significantly the level of anaemia, while in wet seasons; the intensity of infection appears not to have really influenced the degree of anaemia (Table 2).

Table.1 Prevalence of *H. contortus* infection relating to probable variation factors

Variables	Category	No. examined	No. of Infected	Prevalence
Species	Sheep	350	168	48.00%
	Goat	350	167	47.71%
Season	Wet	300	134	67.00%
	Dry	400	201	33.50%
Sex	Male	228	82	35.96%
	Female	472	253	53.60%
Age	≥ 1 year	467	196	41.97%
	≤ 1 year	233	97	41.63%
Anaemia	Non anaemic	496	178	35.88%
	Anaemic	159	124	77.98%
	Very anaemic	45	44	97.77%

Table.2 Prevalence (%) of anaemia relative to *H. contortus* burden (EPG) and season

Intensity of infection	Dry season			Wet season		
EPG level	Non anaemic	Moderate anaemic	Severely anaemic	Non anaemic	Moderate anaemic	Severely anaemic
Heavy (>2000)	0.00	72.40	27.60	20.20	60.51	19.31
Moderate (>1000)	32.53	44.23	24.00	83.00	15.67	2.68
Low (<1000)	49.66	35.85	17.50	92.08	8.33	0.00
None	92.00	7.24	0.80	96.28	3.32	1.50

Table.3 Seasonal prevalence (%) of *H. contortus* and EPG levels

Month	No. Examined	No. Infected	Prevalence	Mean EPG level
October 2016	**100**	**72**	**72.00%**	**2800**
November 2016	**100**	**68**	**68.00%**	**2600**
December 2016	**100**	**61**	**61.00%**	**1800**
January 2017	**100**	**47**	**47.00%**	**1400**
February 2017	**100**	**33**	**33.00%**	**800**
March 2017	**100**	**30**	**30.00%**	**600**
April 2017	**100**	**24**	**24.00%**	**400**
Total	**700**	**335**	**47.85**	**310**

During the study period, infestations with *H. contortus* have evolved endemic. The overall prevalence of (47.85%) reflects the importance of these bloodsucking parasites in the study region. This is still very low compared to the prevalence reported in other countries: 82% in Togo (Bonfoh *et al.,* 1995); 94% in Middle Guinea (Barry *et al.*, 2002) and 60% in Eastern Ethiopia (Sissay, 2007). Lower prevalence also been reported elsewhere (Tariq *et al.,* 2010; Dagnachew *et al.,* 2011; Qamar *et al.,* 2011).

Haemonchosis has been very prevalent in rainy seasons. This seasonal effect has already been reported in previous studies (Barry *et al.*, 2002; Regassa *et al.,* 2006; Sutar *et al.,* 2010). However, contrary to some reported data (Tasawar *et al.*, 2010; Biu *et al.,* 2009). Age had no significant influence in the occurrence of infections. Maybe the ages clustering did not allow sufficient variability (just two groups around one year old). Similarly, no difference due to species could be established. This is not in agreement with the reports of Raza *et al.*, (2009), but this is understandable since in the study areas, the increase in planted land is forcing sheep and goats to the same grazing way around houses or on fallow lands where the parasitic risk appears to be identical for all. And likely, the chronic nature of the infection induced some adaptive resistance. It is also possible that a combination of breed and environmental factors are responsible for this observation. Yadav *et al.,* (1989) reported the highest EPG level during rainy season than in winter and summer. Gupta and Mathur (1969) recorded the peak parasitism with G.I parasites in sheep and goat of Tamilnadu (Madras) during the months from November to January.

The seasonal variation of EPG levels was similar to previous observations in Eastern Ethiopia (Sissay *et al.,* 2007). EPG levels were higher in wet seasons than dry. The wet months are indeed characterized by forage availability and animals are then able to compensate the spoliation caused by worms; hence their relatively good health condition despite a significant infestation. While in dry season, anaemia is quite common despite the moderate worm burden, anaemia is due to both scarcity of forage and *Haemonchosis* in this period. This agrees with Vatta *et al.,* (2002) who pointed *Haemonchus* spp. as one of the most important helminth in small ruminants from resource-poor areas.

This study disclosed haemonchosis is a very important parasitic disease in small ruminants in the study region. Its endemicity and intensity are likely some negative factors for productivity. However, the strong influence of the season is a favourable factor to be considered in the prophylactic fight. It would be wise to include in the control of this parasite, targeted therapies using herd management with emphasis on the seasons and the life cycle of *Haemonchus* spp.

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