Prevalence of *Hypoderma lineatum* in cattle of Jammu region

Anish Yadav · Rajesh Katoch · J. K. Khajuria ·
Rajesh Godara · Rajesh Agrawal

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Abstract Clinicoparasitological examination of 750 cattle from Jammu region revealed prevalence of *Hypoderma lineatum* infestation in 9.73 %. Cattle from Jammu (plain irrigated area) district (397) did not reveal any infestation of hypodermosis, but in Samba district (semi hilly arid area) 20.63 % (73/353) animals harbored *H. lineatum* larvae. The warbles were recorded from October to March and the mean number of warbles per animal was 7.07 ± 0.45 . Infestation significantly varied in different age groups and free grazing practice of animals was one of the risk factor for hypodermosis in cattle of Jammu region.

Keywords Hypodermosis · *Hypoderma lineatum* · Prevalence · Bovine · India

Introduction

Bovine hypodermosis is a myiasis caused by larvae of *Hypoderma bovis* and *Hypoderma lineatum*, and is characterized by the presence of warbles under the skin of infested animals (Zumpt 1965). It causes economic losses by reducing milk yield, weight gain, quality of beef and hide damage (Hassan

et al. 2010). Over the past few years usage of avermectins has greatly decreased the spread of hypodermosis in many European and North American countries. In contrast, hypodermosis is still spreading in poor socio economic settings (Otranto et al. 2005) mainly in Asiatic countries where routine treatment against these flies are not carried out. In India as reviewed by Chhabra and Pathak (2009), high prevalence of cattle hypodermosis has been documented in Sub Himalayan northern states. *H. lineatum* have been recorded from cattle of Himachal Pradesh (Sharma et al. 1999; Katoch et al. 2005), Haryana (Singh and Chhabra 1973), and Rajasthan (Kumar et al. 1990). The present study was contemplated to record the prevalence of hypodermosis in cattle of Jammu region.

Materials and methods

Study area

The study was conducted in Jammu and Samba districts of Jammu region. The study area under Jammu district was located in R.S. Pura, Bishnah and Jammu tehsils which is mainly plain irrigated belt (falling south west of Jammu Pathankot national highway and extending along Indo Pak international border) and located at an average altitude of 330 m above sea level. The Samba district is located in foothills of Himalayas at an average altitude of 520 m (falling north of Jammu Pathankot national highway) of Jammu district having shallow soil, rock with negligible water and the climate remaining dry and hot during March to August.

Study animals and larvae examination

A total of 397 and 353 cattle were examined in Jammu and Samba districts, respectively from January, 2002 to

A. Yadav (✉) · R. Katoch · J. K. Khajuria · R. Godara
Division of Veterinary Parasitology, Faculty of Veterinary
Sciences and Animal Husbandry, Sher-e-Kashmir University
of Agricultural Sciences and Technology of Jammu, R.S. Pura
181102, Jammu and Kashmir, India
e-mail: anishyadav25@gmail.com

R. Agrawal
Division of Veterinary Medicine, Faculty of Veterinary Sciences
and Animal Husbandry, Sher-e-Kashmir University
of Agricultural Sciences and Technology of Jammu, R.S. Pura
181102, Jammu and Kashmir, India

December, 2004. The age, sex and breed of each animal were recorded and information regarding the grazing management, grazing period and treatment against *Hypoderma* larvae was also recorded. The animals were examined clinically, accessed for palpable swellings beneath the skin and their numbers were counted. Mature larvae from infected animals were collected by squeezing the warbles, brought to the laboratory, processed and identified with the help of keys given by Sen and Fletcher (1962) and Zumpt (1965).

Statistical analysis

A χ^2 test was used to test the independency of attributes. One way ANOVA was used to evaluate the intensity of warble fly infestation in different age groups, sexes and breeds. Duncan multiple range test was applied to test the significance of different means of different age groups, sexes and breeds.

Results and discussion

The overall prevalence of hypodermosis in cattle of Jammu region was 9.73 % and is presented in Table 1. Clinical examination of 397 cattle in Jammu district did not reveal any infestation of hypodermosis, but in Samba district 20.63 % (73/353) animals harbored *H. lineatum* larvae. Absence of hypodermosis in the cattle of Jammu district might be attributed to the presence of high soil moisture in irrigated area of Jammu district which adversely affects the growth of pupa in the soil (Sen and Fletcher 1962). On contrary, Samba district has semi hilly, dry areas and rainfed rivulets which remain dry during majority part of the year. Earlier hypodermosis has been reported from Himalayan region extending from Kashmir valley to Darjeeling, although infection is rare in Kashmir valley. In India, the disease was first reported by Patton in 1924 from Punjab. Later, Sen and Fletcher (1962) documented prevalence of hypodermosis in united India from North to West Frontier Province, Sind, Baluchistan and Rawalpindi. Kumar et al. (1990) recorded it from drought affected cattle of Bikaner. Increasing incidence of hypodermosis was reported from region of Kangra valley of Himachal Pradesh having sandy soil in rainfed rivulets (Katoch et al. 2005).

The collected larvae were barrel shaped, measuring 22–25 mm long, 10–12 mm in diameter and had 11 segments bearing transverse rows of spines on ventral sides from 2nd to 10th segment while dorsal and lateral sides showed tubercles (Fig. 1). The posterior spiracles were kidney shaped, flat and did not completely envelope the ecdysal scar.

Statistical analysis revealed a significant difference ($P < 0.05$) of infestation among animals of different age groups with maximum prevalence (13.57 %) in the animals

Table 1 Prevalence and intensity of *H. lineatum* infestation in cattle of Jammu region

Parameters	Number of animals		Intensity of larvae (Mean $\pm$ SE)
	Examined	Infested (%)	
Age (in years)			
<1	148	1 (0.68 ^a)	4*
1–4	339	46 (13.57 ^b)	8.50 $\pm$ 0.38 ^a
>4	263	26 (9.89 ^c)	7.30 $\pm$ 0.49 ^b
Breed			
Zebu	248	23 (9.27)	8.08 $\pm$ 0.37
Crossbreed	502	50 (9.96)	8.22 $\pm$ 0.21
Sex			
Male	66	7 (10.61)	8.14 $\pm$ 0.92
Female	684	66 (9.65)	8.16 $\pm$ 0.31
Grazing practice			
Field grazing	474	67 (14.14 ^a)	8.20 $\pm$ 0.30 ^a
Stall fed	276	6 (2.17 ^b)	5.83 $\pm$ 0.60 ^b
Overall	750	73 (9.73)	7.07 $\pm$ 0.45

Figures with different superscripts vary significantly ($P < 0.05$)

* Only one animal was positive

Fig. 1 Mature larvae of *H. lineatum*

of 1–4 years age group. Similarly, a significant ($P < 0.05$) difference of warble infestation was observed among grazing and stall fed animals. In <1 year age group, only one animal was found positive for warble in February. History revealed that animal was born in March of previous year and was kept on stall feeding. Similarly a significant ($P < 0.05$) difference of warble infestation was observed among grazing and stall fed animals. Young animals below 1 year are mainly stall fed and generally not let loose for grazing which may also be one of the reasons for low prevalence among them (Otranto et al. 2001).

The affected animals were weak and debilitated despite the normal feeding. The warbles were observed on the back

and flank region of the animals. The warbles were found in cattle from October to March, where its formation started in October and the perforation by the *Hypoderma* larvae in the skin started in December and remained up to mid March. The mean number of warbles in the infested animals was 7.07 ± 0.45 (ranging from 4 to 36) (Table 1). However, 100–150 mature larvae in certain parts of Punjab, Sind and Rajputana have been reported (Sen and Fletcher 1962).

The overall correlation of stages observed suggest that late March and April are the pupation period of *H. lineatum* in this region and flies are active from April to June. Tarry (1980) have also reported that warm and sunny days favorable for adult *H. lineatum* activity which exist during these months in this region. Thus, the most suitable time for control of first stage larvae are the months of July and August.

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