

Prevalence and Treatment Practices of *Parafilaria bovicola* in Raya-Kobo District, Northeastern Ethiopia

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Abstract: Cross-sectional study was conducted to determine the prevalence and treatment practices of *Parafilaria bovicola* in Raya-Kobo district, Northeastern, Ethiopia. A questionnaire was distributed for 200 farmers and examination of 480 blood samples collected from subcutaneous nodules and cutaneous bleeding points were carried out. Parafilariasis (locally called Nesir or Mergem) was known by 82.50% of respondents and they practice different techniques for the treatment of the problem however, highest numbers of farmers (60.50%) were using Ivermectin. An overall prevalence of 20.42% was recorded. Prevalence was 22.89% in male and 16.84% in female animals, 22.92% in animals kept in low altitude and 17.92% in mid altitude areas, 22.55% in extensive and 8.33% in intensive farming system. Prevalence of 26.57, 14.40 and 5.80% was also recorded in animals greater or equal to five, between two and five and less than or equal to two years of age, respectively. Prevalence of 25.60, 21.82, 20.69, 19.77 and 14.62% was recorded in predominantly red, white, brown, gray and black coloured animals, respectively. Prevalence of 35.56, 14.52, 13.04 and 4.65% was recorded in lactating, dry and pregnant cows and young females, respectively. Statistically significant difference ($P < 0.05$) was observed among age groups, management systems and physiological status of the female animals. In conclusion, *P. bovicola* was prevalent parasite in the study area; therefore, emphasis should be given for its prevention and control.

Key words: Microfilariae % Parafilaria Bovicola % Parafilariasis % Prevalence % Raya Kobo

INTRODUCTION

Parafilariasis is a vector-borne parasitic infection of cattle and buffalo which results in painful and irritating cutaneous nodules worldwide [1-3]. Adult worms located in the subcutaneous connective tissue producing inflammatory lesions and haemorrhagic nodules up to a small nut size and subsequent bruise-like lesions in the upper part of the body (shoulder, neck, withers, groin, thoracic area and ribs) [4]. In beef producing countries, *Parafilaria bovicola* 'verminous nodules' is important by causing damage to the subcutaneous tissues. Carcasses of infected animals display irregular, oedematous, greenish yellow lesions that resemble bruising. Occasionally, underlying muscles are extensively involved. Trimmed carcasses are often seriously disfigured and consequently downgraded.

In severe cases, the carcass may be condemned. Other economic loss incurred due to parafilariasis is related to the rejection or downgrading of skin and hides [5].

In Ethiopia, hides and skins have large contribution to the leather industry and played lot to the export earnings. Annually, hides and skins accounting for 14-16% of the total export revenue of the country [6]. Despite this, hides and skin problems caused by parasitic diseases are among the major causes for reducing the gain from the sector [7, 8].

Parafilariasis is known to be present in the country [9]. The information regarding the distribution of the parasite, treatment methods and the role of different risk factors are not yet determined in Raya-Kobo (RK) district, northeastern Ethiopia. Therefore, this study was designed to determine the prevalence and to assess farmers'

perception, treatment practices and the influence of different risk factors for the occurrence of the parasite in cattle in RK district, north-eastern Ethiopia.

MATERIALS AND METHODS

Study Area: The study was conducted in Raya-Kobo district, northeastern Ethiopia. The district has lowland (below 1500 meters above sea level) and midland (1500 to 2200 meters above sea level) agroclimatic zones. The area has bimodal rainfall from June to mid of August and short rain between March and April. The vegetation is savannah grass-land containing bushes and shrubs. The district has about 210,717 cattle population [10].

Study Animals: Study animals were indigenous zebu cattle of different age, sex, coat colour, physiological status and kept in intensive and extensive husbandry systems. Animals in intensive system were fully housed and supplied with concentrate feed. Water and roughage was supplied the whole day and get veterinary health care whereas, cattle kept in the extensive system which contributes the higher population of cattle in the district. They were allowed to graze in the field freely in day light and housed during the night in poorly constructed barn. In dry season, they were supplied with crop residues.

Sample Size Determination: Since, there was no any study done concerning parafilaria of cattle in Raya kobo district, the sample size was estimated by using 50% expected prevalence with 95% confidence interval at 5% absolute precision [11]. Hence the calculated sample size was 384 however in order to increase the probability of estimating the actual population prevalence 480 animals were included in the study.

Study Design: A cross-sectional study was conducted from September to December, 2011. Presence or absence of *P. bovicola* was the output variable. Age, sex, management system, physiological status (in female) and coat colour were considered as explanatory variables. Based on their age, animals were categorized into three by using dentations pattern as described by Williamson and Payne [12]. Based on altitude, the district was categorized into lowland and midland; approximately equal numbers of animals were included in the two agro-climatic zones. Distribution of *P. bovicola* was studied by the questionnaire survey. A total of 200 farmers which have cattle both from rural and peri-urban areas of RK district were interviewed by using both close and open ended predesigned questionnaire.

Sample Collection: Cattle were randomly selected and owners asked for presence of subcutaneous nodules and bleeding points, locally named as “Nesir or Mergem”. Then, selected animals were thoroughly examined. Emphasis was given for areas of the shoulder, neck, withers, groin, thoracic area and for sites where there was erection of hair. When there were nodules, they were incised until bleeding with the tip of scalpel blade and blood samples were collected in test tubes containing 1ml of 0.85% saline. Similarly, blood samples were also collected when active bleeding points were observed.

Laboratory Examination: In the laboratory, blood samples were centrifuged at 400 rpm for 10 minutes to deposit free microfilariae or eggs containing microfilariae of *P. bovicola*. Presence of *P. bovicola* was confirmed by finding the characteristic eggs containing microfilariae or free microfilariae or both, under the microscope as described by Urquhart *et al.* [13] in the district veterinary laboratory.

Data Analysis: The data was analyzed using Stata version 11. Prevalence of parafilaria was expressed as percentage by dividing the number of samples or animals positive for *P. bovicola* to the total number of samples or total number of animals examined. The Chi-square (X^2) test was used to assess differences in the prevalence of the diseases among breed, sex and age groups. In all cases, $p < 0.05$ were set for significance.

RESULTS

Of the 200 farmers interviewed, 82.50% indicated parafilaria as ‘Nesir or Mergem’ and listed it as one of the most important priority skin disease of cattle in the district. Farmers indicated that parafilaria lesions are more commonly occurred on the neck, shoulder, wither, groin and thoracic area. Most of the farmers (60.50%) were also more dependent on use of ivermectin for the control of the parasite. However, traditional practice like hot water therapy, keeping animals under the shelter, branding and drenching of crushed plant leaves were also used (Table 1).

Of the total 480 animals examined, 98 (20.42%) were positive for *P. bovicola*. Prevalence of parafilaria in low and mid altitude was 12.92 and 22.92%, respectively. However, the difference was not statistically significant. The prevalence was 22.89% in male and 16.84% in female cattle. However, there was also no statistically significant difference between sex groups. Significantly ($P < 0.05$) high prevalence (26.57%) was observed in cattle greater

Table 1: Traditional treatment status of *Parafilaria bovicola*

No	Treatment Methods	Respondents	
		Number	Percent (%)
1	Branding around the lesion	19	9.50
2	Keeping animals under shelter	23	11.50
3	Drenching of herbal preparation	8	4.00
4	Hot water application	29	14.50
5	Ivermectin	121	60.50

Table 2: Prevalence of parafilariasis between male and female cattle in the district

Risk Factor	Categories	Number Examined	Positive		Chi-square	P-value
			Number	Percent		
Agro-climate	Mid altitude	240	43	17.92	1.84	0.17
	Low altitude	240	55	22.92		
Sex	Male	284	65	22.89	2.61	0.10
	Female	196	33	16.84		
Age	#2 years	69	4	5.80	18.53	0.00
	2-5 years	125	18	14.40		
	\$5 years	286	76	26.57		
Predominant coat colour	Black	130	19	14.62	4.91	0.29
	Red	125	32	25.60		
	Gray	86	17	19.77		
	White	110	24	21.82		
	Brown	29	6	20.69		
Management system	Intensive	72	6	8.33	7.61	0.006
	Extensive	408	92	22.55		
Physiological status	Pregnant	46	6	13.04	16.53	0.001
	Lactating	45	16	35.56		
	Dry	62	9	14.52		
	Heifers	43	2	4.65		

than and equal to 5 years while the lowest prevalence (5.80%) was observed in cattle less than two years of age. The prevalence among cattle of different coat colour was not statistically significant. Significantly ($P<0.05$) higher prevalence (22.6%) was observed in cattle kept in intensive than that of extensive (8.33%) management system. Prevalence of parafilariasis was also compared in female cattle of different physiological state. Significantly ($P<0.05$) highest prevalence (35.56%) was observed in lactating cattle while the lowest prevalence was observed in young female cattle (Table 2).

DISCUSSION

The questionnaire survey indicated that *P. bovicola* is one of the most important priority skin diseases of cattle in RK district. Parasitic nodules found on the neck, shoulder, wither, groin and thoracic area. Highest distribution of the parasite was observed on shoulder, neck, thoracic area and the wither region of the animal. This was in agreement with the work of Borgsteede *et al.*

[14] who reported *P. bovicola* cutaneous nodules distributed in the neck, shoulder and back regions of a breeding bull in Netherlands imported from France.

Different treatment options were mentioned by respondents in addition to the treatment method (use of ivermectin), the effectiveness of these methods has to be evaluated well. The importance of ivermectin in the treatment of parafilariasis is well documented since it shows a marked reduction in bleeding points and resolution of the muscle lesions and a significant reduction in meat condemnation [13, 15]. Other alternative drugs like nitroxylnil and levamisole were not utilized. Long term application of a single drug may promote the chance of drug resistance.

The overall prevalence of 20.42% was observed in the district which was less than prevalence of 36% reported in cattle from South Africa [13]. Similarly, retrospective studies in Sweden revealed that parafilarial lesions at slaughter occurred in 35% of the young cattle from herds exposed to face flies on pasture during the year preceding slaughter [16].

Higher prevalence of *P. bovicola* was observed in cattle greater than and equal to 5 years of age followed by animals between 2 and 5 years of age; while the lowest prevalence was observed in cattle less than two years of age. Increase in prevalence of *P. bovicola* with age might be associated with increase in exposure to infected vectors and very young animals are less exposed as they usually kept indoors. However, it contradicts with the work of CFADUSAHA [17], reported that no age preference of cattle in cases exposure to *P. bovicola*.

When prevalence of *P. bovicola* was compared among cattle of different coat colour, it was higher in red coat colour however significant difference was not observed in the current study which contradicts with the work of CFADUSAHA [15] who reported higher prevalence in light-coloured breeds and justified it in relation to easy recognition of bleeding points more easily in light-coloured breeds.

Higher level of prevalence of *P. bovicola* was observed in cattle kept in extensive than cattle kept in intensive management system. The result in this study was in agreement with the work of Bech-nielsen *et al.* [14] who reported that *P. bovicola* lesions were not found in cattle from herds managed indoors. The reason might be associated with exposure for transmitting vectors as cattle kept indoors are less exposed to face flies.

Prevalence of *P. bovicola* was also compared between female cattle of different physiological status; highest prevalence was observed in lactating cows followed by dry and pregnant cows while the lowest prevalence was observed in young females. This might be associated with level of immunity and level of exposure to the vector. Adult cattle especially those kept in extensive management system have frequent exposure than young ones. Lactation and pregnancy can cause relaxation of immunity, therefore, might cause higher prevalence.

In summary, *P. bovicola* is known by farmers affecting their cattle and they were tried to control it by using traditional practices and modern treatments. Age, management system and physiological status (in females) are important factors affecting occurrence of *P. bovicola* in cattle. Significantly high level of prevalence was observed in adult, lactating cattle and kept in extensive management system. Therefore, farmers should be informed regarding the economic importance and about possible control and prevention measures of *P. bovicola*. Epidemiological study of the parasite and transmitting vector should be done in the area.

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