



Seroprevalence epidemiological studies on equine trypanosomosis using Ab-ELISA in a part of semi-arid zone of northern plains of India

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ABSTRACT

In the present investigation, seroprevalence and host related epidemiological factors of equine trypanosomosis were assessed using Ab-ELISA. Serum samples (515) of equines (horse–227, mule–249 and donkey–39) suspected for trypanosomosis (surra) were collected during April 2014 to March 2015, from 7 districts of semi-arid zones of northern plains of India. Overall seroprevalence of 22.33% was recorded indicating endemicity of surra in equines of the region. Maximum prevalence was recorded in district Mathura (24.81%) followed by Bharatpur (23.26%) and the lowest prevalence was recorded in Hathras (16.23%) district. Trypanosomosis was prevalent throughout the year in the region and higher prevalence was observed in monsoon and post monsoon months followed by winter and least in the summer. Prevalence of trypanosomosis in equines does not vary with the host related factors, viz. sex, age, species, pregnancy status and months of pregnancy in the region.

Key words: Ab-ELISA, Equine, Prevalence (%), Seroprevalence, Surra, Trypanosomosis

Trypanosoma evansi is an extracellular haemo-flagellate transmitted mechanically by the Tabanid flies in a wide range of animals causing trypanosomosis, commonly known as surra (OIE 2010). The typical signs are intermittent fever, progressive anaemia, weight loss, oedema of dependent parts, conjunctivitis, marked depression, abortion, petechial haemorrhages, neurological abnormalities and sudden death (Saleh *et al.* 2009). Surra mostly occurs as an endemic disease in northern and eastern India as the hot and humid climate of northern India is very much favourable for development and survival of vectors of this disease (Laha and Sasmal 2008). Keeping in view the endemicity and importance of trypanosomosis in equines, the present investigation was conducted with a comprehensive plan to evaluate seroprevalence and host related epidemiological studies of *T. evansi* in 7 districts of the semi arid zone of northern plains of India.

MATERIALS AND METHODS

The study was performed on equines of 7 districts adjoining Mathura of semi-arid zone of northern plains of India from April 2014 to March 2015. All the animals belonged to owners with lower socio-economic status

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mostly involved in brick industry. The samples were collected individually from the field based on calls received from the owners explaining various clinical signs/illness of their animals in collaboration with Brooke hospital for animals. The animals exhibiting clinical signs suggestive of surra such as fever, anorexia, loss of body condition, neurological signs and lack of performance were selected for the study. Equines suspected to be affected for trypanosomosis (Surra) were examined monthly and host related data, viz. sex, age, species, pregnancy status and month of pregnancy of suspected equines were also recorded for epidemiological studies. Simultaneously, all positive animals under study were treated accordingly as per their tentative clinical conditions. The serum samples were transported to Parasitology Laboratory, NRC on equines, Hisar, for detection of antibodies against *T. evansi* by Ab-ELISA test using reference positive and negative serum samples.

Blood samples (10 ml) were drawn from animal's jugular vein aseptically with a sterilized disposable syringe and allowed to stand undisturbed in slant position. The clots were retracted and the serum was separated by centrifugation. The serum collected was stored in a deep freeze at –20°C in cryo vials, which were properly capped and labeled until use. The samples were tested by antibody ELISA using whole cell lysate (WCL) antigen as per Yadav *et al.* (2013).

The epidemiological studies, in term of overall prevalence, district wise prevalence, month wise prevalence

and host related epidemiological factors, viz. sex, age, species, pregnancy status and month of pregnancy wise prevalence, were analyzed and assessed as per Thrusfield (2008). For a more accurate assessment of host related epidemiological factors of trypanosomiasis in the region, equines were further categorized as sex-wise (male and female), age-wise (<5 year, and >5 years), species-wise (horse, mule, donkey), pregnancy status wise (pregnant and non-pregnant) and month of pregnancy wise (< 5 months of pregnancy and > 5 months of pregnancy).

RESULTS AND DISCUSSION

Out of 515 serum samples of equines, collected and tested by Ab-ELISA, 115 equines were positive for *T. evansi*, showing a seroprevalence (overall) of 22.33% indicating endemicity of surra in equines in the region (Table 1). The higher prevalence of trypanosomiasis detected in equine population of the region, could be explained by favorable environmental condition for breeding of vector flies in low lying areas due to presence of river basins of Ganga and Yamuna in the region (Juyal 2011). There are only few reports in the literature describing seroprevalence (%) of *T. evansi* in equines in northern plains of India (Table 2). Our findings are in corroboration with Kumar *et al.* (2013) who reported more or less similar seroprevalence of *T. evansi* in equines of Uttar Pradesh state and also observed an overall prevalence of 11.36% in north and north-western regions of India using Ab-ELISA. Our findings also indicated that trypanosomiasis in equines is endemic in semi arid zone of northern plains of India, and more prevalent in semi arid zones than other regions of northern plains of India.

Area-wise prevalence were also recorded and the maximum prevalence was recorded in district Mathura followed by Bharatpur > Agra > Aligarh > Kasganj > Bulandshahar and the least prevalence was recorded in

Table 1. Seroprevalence (%) of *T. evansi* in equines using antibody-ELISA in different districts of semi arid zones of northern India

Districts	No. of equines examined (suspected) (total=515)	No. of equines (positive) (total=115)	Prevalence (%) (overall=22.33)
Mathura (Uttar Pradesh)	270	67	24.81
Aligarh (Uttar Pradesh)	48	9	18.75
Bulandshahr (Uttar Pradesh)	33	6	18.18
Agra (Uttar Pradesh)	52	11	21.15
Hathrash (Uttar Pradesh)	37	6	16.23
Kasganj (Uttar Pradesh)	32	6	18.75
Bharatpur (Rajasthan)	43	10	23.26

Table 2. Seroprevalence (%) of *T. evansi* in equines in different months using antibody-ELISA in semi arid zones of northern India

Month	Suspected examined	Positive no of cases	Prevalence (%)
April (2014)	24	03	12.50
May (2014)	22	03	13.64
June (2014)	20	02	10.00
July (2014)	41	07	17.07
August (2014)	58	15	25.86
September (2014)	77	25	32.47
October (2014)	71	21	29.58
November (2014)	53	13	24.53
December (2014)	44	10	22.73
January (2015)	38	08	21.05
February (2015)	41	05	12.20
March (2015)	26	03	11.54
	515	115	22.33

Hathras district. The high prevalence of trypanosomiasis detected in equine population in these regions, could be explained by favorable agroclimatic condition in these regions which favors breeding of vector flies.

On analyzing month-wise prevalence, the maximum prevalence was recorded during September 2014 followed by October 2014 and the least prevalence was recorded in the June 2014. In order of decreasing prevalence, the results were as follows: September > October > August > November > December > January > July > May > April > February > March > June. The disease was prevalent throughout the year in the region and higher prevalence was recorded during monsoon and post monsoon months, followed by winter and least in summer. The variations in the prevalence pattern of *T. evansi* infections in equines could be due to the vector population increase in considerable number during rainy and post-rainy seasons than the winter and summer months of year. Inclement weather such as hot and humid climate in monsoon and thereafter has also been incriminated to depress the body defense mechanism thereby resulting in the exacerbation of *T. evansi* infection in equines. Similar findings were also reported by Muraleedharan *et al.* (2005) and Sinha *et al.* (2006).

Analysis of host related factors during the investigation revealed that prevalence of trypanosomiasis in equines does not vary with the sex, age, species, pregnancy status and months of pregnancy (Table.3). Our findings are contrary to the observations of Kumar *et al.* (2013), who observed higher prevalence of trypanosomiasis in mules than horse and donkey. The literature could not reveal much citation regarding host related epidemiological factors in equine trypanosomiasis. However, such studies have been carried out in other species of animals by various workers. Eyasu *et al.* (2013), Mbahin *et al.* (2013), Rundassa *et al.* (2013), had earlier observed similar findings in bovine trypanosomiasis. The findings of this study are dissimilar with the findings of Bhutto *et al.* (2010), who reported that there was variation in the prevalence of trypanosomiasis

Table 3. Per cent prevalence of *T. evansi* infection in equines according to various host related factors (sex, age, species, pregnancy status and months of pregnancy) by using antibody-ELISA in semi arid zones of northern India

Host related factors		No. of examined (515)	No. of positive (115)	Prevalence (%) (22.33)	Chi-square value
Sex	Male	297	64	21.55	$\chi^2 = 0.25^{NS}$
	Female	218	51	23.39	
Age (years)	< 5	209	42	20.10	$\chi^2 = 0.01^{NS}$
	> 5	306	73	23.86	
Species	Horses (H)	227	50	22.03	$\chi^2 = 5.78^{NS}$
	Mules (M)	249	62	24.90	
	Donkeys (D)	39	3	7.70	
	Pregnancy				
	Preg. (H+D)	34	9	26.47	$\chi^2 = 0.00^{NS}$
	Non preg. (H+D)	50	13	26.00	
Months of pregnancy	< 5	9	2	22.22	$\chi^2 = 0.11^{NS}$
	> 5	25	7	28	

with age, sex, breed and herd size in camels.

In conclusion, trypanosomiasis in equines is found to be highly endemic and prevalent throughout the year of study in the region and higher prevalence was observed in monsoon and post monsoon months. Prevalence of trypanosomiasis in equines does not vary with the host related factors, viz. sex, age, species, pregnancy status and months of pregnancy in the region.

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