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SEROPREVALENCE OF *NEOSPORA CANINUM* AMONG ABORTED CATTLE IN CENTRAL KERALA, INDIA

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ABSTRACT

Neospora caninum (*N. caninum*) is an abortifacient protozoa infecting cattle throughout the world, though it has not been identified as of common occurrence in the state of Kerala. The study of prevalence of neosporosis in cattle was undertaken to assess its role in abortion. A total of 50 blood samples collected from cattle that had aborted, were tested using Indirect Fluorescent Antibody Test to detect *N. caninum* antibodies. The overall prevalence of *N. caninum* was found to be 18 per cent (14/50). The prevalence of the organism in cattle in organised farms was detected as 5.26 per cent (1/19) while in households it reached 41.9 per cent (13/33). Higher proportion of seropositivity was observed in animals that had aborted during the second stage of gestation.

Keywords: *Neospora caninum*, Abortion, Cattle, Kerala

INTRODUCTION

Neosporosis is a protozoon disease caused by the coccidian parasite *N. caninum* belonging to the family Sarcocystidae. Due to its close resemblance to *Toxoplasma gondi*, which is of high medical as well as veterinary importance, it was recurrently misdiagnosed as such until Dubey and colleagues succeeded in isolating the parasite in 1988. The parasite is distributed worldwide and infects a broad range of animals including cattle, sheep, goats, deer, horses and dogs. Also, it has been diagnosed serologically in water buffaloes, camels, foxes and other wild canids (Kul, 2012).

Neospora caninum is responsible for abortion, stillbirth and infertility in cattle. The disease is of considerable importance taking into account the losses due to reduced milk yield, premature calving and reduced weight gain in beef calves, apart

from the losses due to abortion (Dubey and Schares, 2011). In India, there have been only a few reports on the seroprevalence of neosporosis (Meenakshi *et al*., 2007; Sengupta *et al*., 2012; Devada *et al*., 2012). The main objectives of the study were: (i) to determine the seroprevalence of *N. caninum* antibodies in serum of aborted cattle from central Kerala, India and (ii) to analyse the association between seroprevalence and age, stage of abortion and system of management.

MATERIALS AND METHODS

Blood samples from cattle with a history of abortion, from cattle farms or households in Thrissur, Palakkad and Ernakulam districts for a period of 12 months from May 2013 to April 2014 were collected. A total of 50 blood samples collected from cattle with history of abortion, were screened for *N. caninum* infection. Blood samples were centrifuged at 1000 × g for 15 min in order to obtain the serum that was then stored at −20°C until use. Brief history of the cases and data pertaining to factors such as age, system of management and stage of the abortion were recorded.

Sera were analyzed for antibodies to *N. caninum* by indirect fluorescent antibody test (IFAT) using commercially available *N. caninum* IFA substrate slide (VMRD, BIO-DOT Laboratories Pvt. Ltd. New Delhi) following the manufacturer's recommended procedure. In every slide positive and negative controls were included.

The data related to factors like age, stage of abortion and system of management were subjected to chi-square test of independence. All data were analyzed using the software IBM SPSS Statistics 22.0 version.

RESULTS AND DISCUSSION

Out of 50 cattle serum samples tested, nine samples (18 per cent) were found to be positive by IFAT, which was determined by the appearance of more than ++++ fluorescence against a dark background in a fluorescent microscope (Fig. 1). The present study revealed that the seroprevalence of neosporosis in dairy cattle in three districts in Kerala was 18 per cent (Table 1) which was lower when

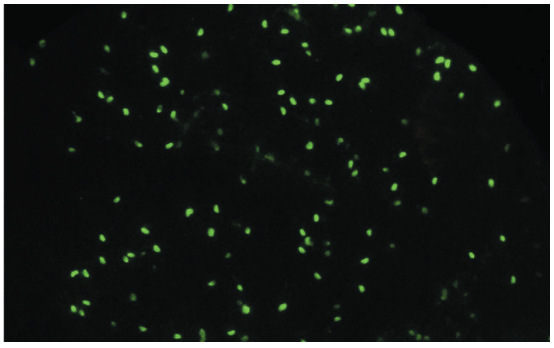

Fig . 1. Positive fluorescence of *Neospora* tachyzoites

Table 1. District-wise prevalence of neosporosis in cattle

Places	No. tested	Positive by IFAT	
		No. positive	Per cent positive
Thrissur	23	04	17.39
Palakkad	17	01	5.88
Ernakulam	10	04	40
Total	50	09	18

Table 2. Animals positive for *N. caninum* antibodies by IFAT in various stages of abortion

Abortion stage	No. examined	No. positive	% positive	value	p-value
First stage (<3 months)	14	1	7.14	8.361*	0.015
Second stage (3-6 months)	23	08	34.78		
Third stage (>6 months and stillbirths)	13	00	00		

(* - statistically significant at 0.05 level)

compared with the observation of Devada *et al.* (2012) in the same region (27.83 per cent). However, similar studies conducted in plateau of southern peninsular India by Sengupta *et al.* (2012) indicated a lower prevalence (12.61 and 9.97 percent) of *N. caninum* in cattle and water buffaloes, respectively. Meenakshi *et al*. (2007) had also documented a lower seroprevalence of *N. caninum* (8.19 per cent) in cattle and a higher seroprevalence (50 per cent) in buffaloes in Punjab, India.

Among 50 animals screened, two out of ten (20 per cent) cattle which were below three years of age were denoted as seropositive by IFAT. On testing fifteen sera from animals of three to four years of age, two (13.33 per cent) were found seropositive and out of 25 tested from animals above four years of age, five (20 per cent) gave a positive fluorescence. No significant differences were observed when the age groups of seropositive and seronegative animals were compared. These IFAT results were in accordance with Sadrebazzaz *et al*. (2004), Koiwai *et al.* (2006) and Pitel *et al.* (2001) who reported that there was no relationship between age groups and prevalence of infection.

Among 14 animals that had aborted in the first stage, only one (7.14 per cent) was found positive by IFAT. At the same

time IFAT detected a fluorescence in eight (34.78 per cent) out of 23 samples collected from those animals that had aborted in the second stage. On screening 13 animals that had aborted in the third stage, no sera were found to carry antibodies to *N. caninum* by IFAT. The increased rate of abortion in the second stage of pregnancy was found to be statistically significant ($P<0.05$) when compared with the other two stages (Table 2). These results were in accordance with Anderson *et al.* (2000), Dubey and Schares, (2006) and Kul, (2012) who also reviewed that most abortions associated with *N. caninum* occurred within first two trimester of gestation.

Out of the 19 samples collected from organised farms, only one (5.26 per cent) sample was found to be positive and out of 31 samples collected from households/ unorganised farms, eight (25.8 per cent) were found to be positive to *N. caninum* by IFAT. The results among cattle which were from households/unorganised farms, was found to be statistically significant when compared to the cattle from organised farms. These results were in accordance with Sengupta *et al.* (2012) who reported significantly higher seroprevalence in unorganized herds than in organized ones. The increase in prevalence in unorganized herds may be because of easy access of animals to the dogs indicating the possibility of horizontal transmission.

SUMMARY

The present study revealed that the seroprevalence of neosporosis in aborted dairy cattle in Cenral Kerala was 18 per cent. No significant differences were observed when the age groups of seropositive and seronegative animals were compared. However, statistically significant difference was observed in the stage of abortion between seropositive and seronegative cattle. This study also revealed an increased seroprevalence of neosporosis in unorganized herds. Future investigations are to be directed to screen a larger quantum of bovine population of the state to trace the endemic pockets and to control the emergence of this bovine abortifacient.

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