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Short communication:

Prevalence of *Theileria mutans* in swamp buffalo

(Kekerapan berlakunya *Theileria mutans* pada kerbau sawah)

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Key words: *Theileria mutans*, swamp buffalo, anaemia

Abstrak

Untuk menentukan kekerapan berlakunya *Theileria mutans* pada kerbau sawah, 52% daripada 219 kerbau sawah didapati dijangkiti dengan protozoon darah ini. Terdapat perbezaan yang tidak nyata dalam nilai hematologi, purata isipadu korpuskel dan purata kepekatan hemoglobin korpuskel antara kerbau yang dijangkiti dan yang tidak dijangkiti dengan *T. mutans.* Bagaimanapun, 63.26% daripada 49 ekor kerbau yang kurus diijangkiti protozoon darah ini. Nilai-nilai hematologi, purata isipadu korpuskel dan purata kepekatan hemoglobin korpuskel nyata lebih rendah (p <0.05) pada kerbau yang dijangkiti dibandingkan dengan kerbau yang tidak dijangkiti. Tambahan pula, ternakan yang terjangkit juga nyata lebih banyak (p <0.05) daripada yang tidak terjangkit di kalangan kerbau kurus. Kajian ini menunjukkan bahawa *T. mutans* mungkin menjadi lebih patogen apabila kerbau sawah lemah dan kurus.

Abstract

To determine the prevalence of *Theileria mutans* in swamp buffalo, 52% out of 219 non-emaciated swamp buffaloes were found to be infected with this haemoprotozoa. There was no significant difference between the infected and uninfected buffaloes for all haematological parameters, mean corpuscular volume and mean corpuscular haemoglobin concentration values. However, out of 49 blood samples collected from emaciated buffaloes at the same site, 63.26% of the animals, were found to be infected with this haemoprotozoa. In this group of animals haematological parameters, mean corpuscular volume and mean corpuscular haemoglobin concentration values were significantly lower (p <0.05) in the infected animals as compared with the uninfected buffaloes. In addition, the proportion of infected animals was also found to be significantly higher (p <0.05) than the uninfected animals in the group of emaciated animals. This study shows that the *T. mutans* probably become more pathogenic when the swamp buffaloes are weak and in poor body condition.

Introduction

Theileria mutans is one of the commonly encountered haemoprotozoa in swamp buffaloes and cattle in Malaysia. *T. mutans* has also been reported in India, Iran, Turkey, Pakistan, Uganda, Malawi, Kenya, Tanzania, Mozambique (Henson and Campbell 1976) and Australia (Hungerford 1967). This species of *Theileria* has been reported to be non-pathogenic to cattle

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(Hooshmand 1976; Siddiqui 1976). However, there are also reported cases of pathogenic strains of *T. mutans* in Kenya (Duffus 1976), Uganda (Oteng 1976) and Australia (Rogers and Callow 1966).

Oteng (1976) reported that Theileriasis, the disease caused by pathogenic piroplasms in the genus *Theileria* and this included *T. mutans*, was the cause for the mortality of 50% of the annual bovine calf crop in Uganda. This worker further found that 5–10% of the calves that recovered from clinical infections remained unthrifty and stunted, while the steers took up to 5 years to reach economic slaughter weight. He further stated that in adult cattle, the disease could bring about 80–90% mortality among the infected animals. Recovered female often ceased breeding for at least 12 months and abortion occurred in pregnant animals.

In a recent study, Fadzil and Ragavan (1986) reported that what had been identified as *T. mutans* in Malaysia was actually *T. orientalis* based on the vector of the haemoprotozoa. Since their findings were not conclusive, the *Theileria* species found in the present study is referred as *T. mutans* based on its morphology (Rajamanickam 1970).

In Malaysia, swamp buffaloes were thought to harbour the protozoa in a symptomless condition (Camoens 1976). However, its significance to production and health in swamp buffaloes is not well defined in this country. This paper reports some observations of the prevalence and severity of natural infection of *T. mutans* in swamp buffaloes in Malaysia.

Materials and methods

An observation on the prevalence of *T. mutans* in swamp buffaloes was carried out at the Malaysian Agricultural Research and Development Institute (MARDI), Bukit Ridan, Pahang. All the buffaloes in this research station were drenched for gastrointestinal parasites including flukes twice yearly. Blood samples were collected randomly from 219 non-emaciated swamp buffaloes from a herd of about 500. The blood samples were taken from the jugular vein in EDTA vacuum blood collecting tubes. The samples were analysed for haematological values such as packed cell volume (PCV), haemoglobin concentration (Hb) and total erythrocyte count (RBC). The Coulter ZF 6 system (Coulter Electronic Ltd., London) was used to analyse the RBC and Hb. PCV values were analysed by using the Microhaematocrit centrifuge (Hawsley Ltd., London). Mean corpuscular haemoglobin concentration (MCHC) and mean corpuscular volume (MCV) were calculated as recommended by Siegmund (1967).

Concurrently, thin blood smears were made and fixed in absolute methanol. It was stained with freshly prepared Giemsa stain. The smears were then examined under x100 objective for intracellular protozoa, *T. mutans* (Rajamanickam 1970).

In addition to the above mentioned 219 blood samples, 49 blood samples were collected from buffaloes found to be emaciated due to unknown reason. Similar procedures were carried out for blood analysis and haemoprotozoa examination. Similarly, blood from 28 newly bought swamp buffaloes were also examined at the place of purchase. Out of this 28 animals, eight were from Langkawi, Kedah, 14 from Melaka and six from Endau, Johor. In this study, PCV values less than 28% are considered to be anaemic (Abas Mazni et al. 1987).

The data collected were analysed statistically using t-test to test the difference between the means. Chi-square test was carried out to test the significance between the proportion of infected and uninfected animals.

Results and discussion

Out of the 219 blood samples collected from the non-emaciated swamp buffaloes, 52.05% of the animals were found to be positive for *T. mutans* infection *(Table 1)*. However, out of the 49 blood samples collected from the

emaciated buffaloes, 63.26% were found to be infected with *T. mutans (Table 1)*. Anaemia was observed only in 20.17% of the infected non-emaciated buffaloes. However, 41.93% of the infected animals in the emaciated group were anaemic. There was no significant difference (p <0.05) between the infected and uninfected buffaloes for all haematological parameters (PCV, Hb and RBC), MCV and MCHC values in the non-emaciated group. Chi-square test also showed that the difference between the proportion of animals infected and uninfected in this group was not statistically significant. However, in the emaciated group of animals, it was observed that the PCV, Hb, RBC, MCV and MCHC values were significantly lower (p <0.05) in the infected animals as compared with the uninfected buffaloes. The proportion of infected animals was also found to be significantly higher (p <0.05) than the uninfected animals when tested by Chi-square test. These findings may indicate that the *T. mutans* become more pathogenic when the buffaloes become weak due to some other causes.

It was observed that all the eight animals bought from Langkawi, Kedah were found to be negative for *T. mutans* infection. However, 50% of the six Endau buffaloes were found to be infected with *T. mutans*, while 92.86% or 13 out of the 14 animals from Melaka were positive for *T. mutans* infection. Haematological values of these animals indicated that none of the Langkawi animals was anaemic, but 16.67% of the Endau and 21.43% of the Melaka animals were found to be anaemic *(Table 2)*. In the newly bought buffaloes, it is interesting to note that the percentage of infected animals is related to the percentage of anaemic cases.

There are indications that the prevalence of *T. mutans* infection differs in the animals bought from the three locations. Since the number of animals used for this study was small and not representative of the total number of animals in the respective places, the study cannot conclusively indicate that the prevalence differs in these three places. More investigations have to be carried out to determine the prevalence of *T. mutans* in different areas of Malaysia.

Table 1. Haematological values (± SD) of *T. mutans* infected and uninfected non-emaciated and emaciated swamp buffaloes

Animal group	No. of animals (%)	Haematological value		Erythrocyte indices			No. of anaemic animals (%)
		PCV (%)	Hb (g/100 mL)	RBC (10^6/μ mm^3)	MCV (μ^3)	MCHC (%)	
Non-emaciated							
Infected buffaloes	114 (52.05)	32.03 ±5.93	11.25 ±2.40	6.02 ±1.37	54.49 ±11.12	35.28 ±6.01	23 (20.17)
Uninfected buffaloes	105 (47.94)	33.15 ±6.39	11.90 ±2.79	6.33 ±1.44	53.44 ± 8.94	35.98 ±6.31	18 (17.14)
Total	219						41
Emaciated							
Infected buffaloes	31a (63.26)	29.11a ±6.93	8.10a ±2.87	5.12a ±1.84	60.46a ±12.69	27.10a ±4.91	13 (41.93)
Uninfected buffaloes	18b (36.73)	32.64b ±5.99	10.46b ±2.71	6.31b ±1.84	53.85b ±10.20	31.68b ±3.15	2 (11.11)
Total	49						15

Mean values in the same column with different letters are significantly different (p <0.05)

Table 2. Prevalence of *T. mutans* in the newly bought swamp buffaloes

Origin	No. of buffaloes		
	Bought	Positive for *T. mutans* (%)	Anaemic (%)
Langkawi, Kedah	8	–	–
Endau, Johor	6	3 (50.00)	1 (16.67)
Melaka	14	13 (92.86)	3 (21.43)
Total	28	16 (57.14)	4 (14.28)

Conclusion

About 52% of the non-emaciated swamp buffaloes at the Malaysian Agricultural Research and Development Institute, Bukit Ridan, Pahang were found to be infected with *T. mutans*. There was no significant difference in the haematological (PCV, Hb and RBC), MCV and MCHC values between the infected and uninfected buffaloes. However, a higher prevalence was observed in emaciated swamp buffaloes at the same site where 63.26% of the emaciated buffaloes were found to be infected with the haemoprotozoa. In this group of animals, the PCV, Hb, RBC, MCV and MCHC values were significantly lower in the infected animals as compared with the uninfected buffaloes. This study indicates that the *T. mutans* probably become more pathogenic when the swamp buffaloes are weak and in poor body condition.

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