

SEROPREVALENCE OF MELIOIDOSIS IN DAIRY CATTLE IN CHIANG MAI PROVINCE, NORTHERN THAILAND

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Abstract. The seroprevalence of melioidosis in dairy cattle in Chiang Mai Province was investigated using of the indirect hemagglutination antibody (IHA) method. Two hundred and fifty-three samples were tested for serum antibodies to *Burkholderia pseudomallei*. The samples were from a total population of 8,688 dairy cattle in the province; random sampling, stratified by the location of cattle, was used. The seroprevalence was determined as 2% at 1:40 cut-off value, which was estimated to equate to 0.3 % to 3.7 % (95% CI). This report of relatively low disease prevalence in the animal population corresponds to other prevalence studies of the agent in the environment and the human population in the region. The prevalence is markedly different to that reported from northeastern Thailand, where the disease is highly endemic.

INTRODUCTION

Melioidosis is a lethal septicemic disease caused by *Burkholderia pseudomallei*. The organism is a widely distributed environmental saprophyte in tropical and subtropical areas, particularly in Southeast Asia, Indochina, and tropical Australia. Several epidemiological and clinical features of melioidosis are similar in animals and humans (Choy *et al*, 2000). It is assumed that most human and animal cases of melioidosis are due to exposure to contaminated soil or water. There have been reports that suggest that the disease may have been transmitted from man to man, from animal to animal, and from animal to man.

The association of human melioidosis with the presence of *B. pseudomallei* in the soil was demonstrated by Vuddhakul *et al* (1999). In Thailand, epidemiological studies showed a space-time cluster of melioidosis, with a significantly higher proportion of cases in the

north-eastern part of the country, where 80% of children had antibodies (Smith *et al*, 1995; Vuddhakul *et al*, 1999; Dance, 2000). In 1998, Mekaprateep *et al* reported a 22% seroprevalence of melioidosis in dairy cattle in the same region.

The objective of this study was to determine the seroprevalence of antibodies to melioidosis in dairy cattle in the northern area of Thailand, where human infection and soil contamination have been reported to be lower than in the northeastern part of the country.

MATERIALS AND METHODS

Frozen (-20°C) serum samples from dairy cattle in Chiang Mai Province were collected in December 1996. A total of 253 samples were taken from a total population of 8,688 dairy cattle in the province. Stratified random sampling was used as the sampling strategy, with the location of animals forming the strata. Sample size calculated was for an assumed prevalence of 10% at 99 % confidence level and 5% accuracy.

The indirect hemagglutination antibody (IHA) technique was used to test for antibodies

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against *B. pseudomallei*. Antigen preparation and test execution was as described by Mekaprateep *et al* (1998). Two-fold serum dilutions were used from 1:10 to 1:320. The resulting titers were determined by observation of the antigen-antibody agglutination reaction.

Estimation of the population prevalence at 95% CI was calculated from the formula of $p \pm 1.96*SE$.

RESULTS

Titers of 1:40 and >1:40 together did contain 2% of the reactors. The remaining 98% of reactors had titers of 1:20 or lower. Using a cut-off value of 1:40, as suggested by Mekaprateep *et al* (1998), this result translated into a 2% seroprevalence of melioidosis.

Applying the formula to determine the interval estimate to this 2% resulted in a prevalence of 0.3% to 3.7%.

DISCUSSION

Based on the IHA results, a 0.3% to 3.7% seroprevalence was determined for the dairy cattle studied. No results of other investigations in cattle in northern Thailand are available for comparison; Wongwong and Vitoorakool (1999) reported a prevalence of 7.9 % in a confined goat herd in Chiang Mai.

Table 1
Frequencies of melioidosis IHA serum titers of dairy cattle in Chiang Mai Province.

Titer	No. positive	%
<1: 10	118	46.6
1: 10	99	39.1
1: 20	31	12.3
1: 40	4	1.6
≥1: 320	1	0.4
Total samples	253	100

Comparing the 2% seroprevalence against melioidosis in this study with the result of 22% obtained in the northeastern region of the country (Mekaprateep *et al*, 1998), the seroprevalence in northern Thailand is markedly lower.

The risk and incidence of melioidosis in the human population is higher in the northeast than elsewhere in Thailand; this has been attributed to significantly higher contamination of the environment, especially the soil (Vuddhakul *et al*, 1999).

This study provided some indication of the prevalence of melioidosis in dairy cattle in northern Thailand. Although zoonotic transmission of the disease from animals to man is rare, it cannot be disregarded (Redfearn and Palleroni, 1975; Desbrosse *et al*, 1979; Choy *et al*, 2000). Saprozoonotic potential is attributed to melioidosis, because reservoir animals can contaminate the environment and thus trigger new infection (Dedie *et al*, 1993). Mekaprateep *et al* (1998) reported mastitis in cows due to *B. pseudomallei*: consideration ought to be given to protecting consumers from infection.

REFERENCES

- Choy, JL, Mayo M, Janmaat A, Currie BJ. Animal melioidosis in Australia. *Acta Trop* 2000; 74: 153-8.
- Dance DA. Ecology of *Burkholderia pseudomallei* and the interactions between environmental *Burkholderia* spp and human-animal hosts. *Acta Trop* 2000; 74: 159-68.
- Desbrosse F, Dodin A, Gallinamd M. La pseudomorve ou melioidose: Maladie due au bacille de Whitmore, mise en évidence dans la région ouest Parisienne. *Bull Soc Vet Prat France* 1979; 62: 657-72.
- Dedie K, Bockemuehl J, Kuehn H, Volkmer KJ, Weinke T. Melioidose. In: Bakterielle Zoonosen bei Tier und Mensch. Ferdinand Enke, 1993: 169-81.
- Mekaprateep M, Jiwakanon N, Jongkajornpong L, Wara-assawapati W, Leesirikul N. Use of indirect hemagglutination (IHA) test for serodiagno-

- sis of melioidosis in dairy cow. *J Thai Vet Med Assoc* 1998; 49: 35-44.
- Redfearn M, Palleroni N. Glanders and melioidosis. In: Hubbert WT, Mc Culloch WF, Schnurrenberger PR, eds. Diseases transmitted from animals to man. 6th ed. Illinois: Charles C Thomas, 1975: 110-28.
- Smith MD, Wuthiekanun V, Walsh AL, White NJ. Quantitative recovery of *Burkholderia pseudomallei* from soil in Thailand. *Trans R Soc Trop Med Hyg* 1995; 89: 488-90.
- Vuddhakul V, Tharavichitkul P, Na-Engam N, *et al.* Epidemiology of *Burkholderia pseudomallei* in Thailand. *Am J Trop Med Hyg* 1999; 60: 458-61.
- Wongwong N, Vitoorakool C. Report on melioidosis in Chiang Mai. The northern Veterinary Research and Diagnosis Center, Lampang, Thailand. *Quarterly Rep* 1999; 7: 18-22.