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Characteristics, clinical outcomes and factors influencing mortality of patients with melioidosis in southern Thailand: A 10-year retrospective study

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ABSTRACT

Objective: To study characteristics, clinical outcomes and factors influencing mortality of patients afflicted with melioidosis.**Methods:** We retrospectively analyzed 134 patients, with a microbiologically-confirmed diagnosis of melioidosis, during the period from January 2002 to June 2011 at Songklanagarind Hospital, a tertiary care hospital in southern Thailand.**Results:** The prevalence of melioidosis among admitted patients was 36.8 per 100 000 in patients. The median age was 49 years and they were predominantly male. The most common underlying disease was diabetes mellitus (47.01%). The majority of cases (50%) had localized infection. The rates of multifocal, bacteremic, and disseminated infections were 12.7%, 23.1%, and 14.2%, respectively. The lungs were the most common organ afflicted, resulting in infection (24.63%). Splenic abscess as well as liver abscess accounted for 20.90% and 19.40%, respectively. A total of one eighth of the patients had septic shock at presentation. The overall mortality rate was 8.96%. The factors influencing mortality were pneumonia, septic shock, a positive blood culture for *Burkholderia pseudomallei*, superimposing with nosocomial infection and inappropriate antibiotic administration.**Conclusions:** Melioidosis is not uncommon in southern Thailand. The mortality of patients with pneumonia, bacteremia and septic shock is relatively high. Appropriate antibiotics, initially, will improve outcomes.

1. Introduction

Melioidosis, an infection caused by *Burkholderia pseudomallei* (*B. pseudomallei*), is an endemic in Southeast Asia and northern Australia [1]. The clinical manifestations vary from benign local skin and soft tissue infection to sepsis or septic shock [2]. In northeastern Thailand, melioidosis mostly accounts for the common cause of community-acquired septicemia [3]. The mortality rate remains high despite effective antibiotics regimens in the intensive phase of treatment [4]. For patients who had apparently been cured, recurrence occurred mostly within a year. This is another important problem [5].

Previous studies in northeastern Thailand defined several factors, which included age, underlying diseases of patients, the severity of clinical manifestations and antibiotic regimens; these factors influenced mortality and recurrence [4,5].

The incidence in the southern regions of Thailand were relatively low, compared to those in the northeastern regions [6]. In addition to the higher prevalence of *B. pseudomallei* in soil, higher rates of virulent biotype were prevalent in northeastern Thailand [7]. The aim of this study is to establish clinical characteristics, outcomes and factors influencing mortality of the patients with melioidosis in southern Thailand.

2. Materials and methods

2.1. Study design, study site, population and ethical consideration

This retrospective, cross-sectional study was conducted in Songklanagarind Hospital, an 800-bed university hospital in

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Songkhla province, located in southern Thailand. All patients (>1 year old) of Songklanagarind Hospital who had a microbiologically-confirmed diagnosis during the periods from January 2002 to June 2011 were enrolled. Ethical permission was obtained from the research ethical committee of the Faculty of Medicine at the Prince of Songkla University.

2.2. Data collection

Demographic data, clinical manifestations together with treatment including antibiotic regimens were collected from the Hospital Information System, a computerized database system of Songklanagarind Hospital, and analyzed for the risk factors for mortality.

Focal infection was defined by 1 site of infection. Multifocal was defined by multiple sites of focal infection, without bacteremia. Bacteremia was defined by positive blood culture with, or without 1 site of focal infection, while disseminated melioidosis was defined by positive blood cultures with at least two, or more focal infections. Septic shock was described as the presence of hypotension without response to fluid replacement, and associated with hypoperfusion and organ dysfunction. Newly diagnosed diabetes mellitus cases were defined as patients who did not have any treatment including oral hypoglycemic agents, insulin and life style modifications.

Occupations, which were suspected risk factors for melioidosis, were classified into two groups according to the chances of exposure to *B. pseudomallei* from the soil and water. These were divided into high exposure and low exposure occupations. Death was defined by patients who died during initial therapy or during intensive therapy.

2.3. Data analysis and statistic

For descriptive statistics, median with inter-quartile range was used for non-normal distribution and continuous data, while frequency with percentage was used for categorical data. In terms of analytic statistics, for continuous variables, the Mann–Whitney *U* test was used, and for categorical variables, either the χ^2 test with Yates' correction or Fisher's exact test was used. Logistic regression analysis was used to identify independent risk factors for mortality. A *P*-value of less than 0.05 was considered statistically significant difference. R program was used for analysis with package 'commend', 'ICE' and 'epicalc'.

3. Results

During the 10-year study period (2002–2011), a total of 134 patients, with a microbiologically-confirmed diagnosis of melioidosis, were recruited. The prevalence of inpatients with melioidosis was 36.8 per 100000 inpatients. The median age of affected patients was 49 years with the first and third quartile of 34 years and 58 years respectively. A total of 69.40% of the patients were men. In total, 29.10% of the patients were classified as high risk occupations for melioidosis.

The majority of cases were diagnosed throughout the year, rather than just during the rainy season. At least one underlying disease was documented in 99 (73.88%) of patients, and the most common predisposing condition was diabetes mellitus. Renal failure and abnormal hemoglobin disease were identified in 8 (5.97%) and 7 (5.22%) patients respectively. The majority

of patients (89.55%) were treated with parenteral antibiotics as inpatients at Songklanagarind Hospital (Table 1).

A total of 95 (78.51%) patients had a fever prior to admission. Septic shock accounted for 12.40% of patients at initial diagnosis and 21.67% of the patients during hospitalization. A total of 20.83% of the patients required admission into the intensive care unit. A total of 15 patients (12.50%) were superimposed with nosocomial infection. In terms of distribution of infection, 50% of the patients had a localized infection. Multifocal infection, bacteremia, and disseminated infection were 12.69%, 23.13%, and 14.18% respectively.

Overall, there were 12 (8.96%) deaths during hospitalization. After successful treatment, no patient died from any other documented causes. A total of 2 patients died within 2 d, after admission, before laboratory confirmation of the causative organism. Median of time for defervescence was 8 d (Table 2). A total of thirty-three (24.63%) patients presented with community-acquired pneumonia, while only 13 of the 33 patients developed respiratory failure including acute respiratory distress syndrome. Splenic abscess and liver abscess presented in 28 (20.90%) and 26 (19.40%) patients respectively, in the primary diagnosis; however, drainage was required in only 5 patients in splenic abscess, and 2 patients underwent splenectomy. Only one patient with liver abscess underwent abscess drainage.

Similarly to visceral organ abscess, isolated superficial lymph node infection, along with intra-abdominal lymph node infection accounted for 9.70% and 2.24% of the patients respectively. In addition to this, less required aspiration. A total of twenty (14.93%) patients had rheumatologic manifestations involving joints (14 patients with septic arthritis), bones (7 patients with osteomyelitis), muscles (5 patients with muscle abscess) and 5 patients with a combination of the above. Patients, who had septic arthritis required intervention, including surgical drainage and simple aspiration. Genitourinary infection including prostatic abscesses (4.48%) and renal abscess (5.97%), along with parotid gland abscess (3.73%), were less common primary diagnoses (Table 3).

Amongst these patients, indirect hemagglutination antibody against *B. pseudomallei* test was performed in 8 (5.97%) patients, and the titer showed less than, or equal to 1:20 in 1 patient, 1:160 in 1 patient, 1:640 in 4 patients, 1:1280 in 2 patients, and more than, or equal to 1:2560 in 1 patient (data not shown).

On the univariate analysis, gender and age of the patients did not affect the mortality. The high exposure occupations, including rice farmers, gardeners and planters, were not related

Table 1

Demographic data of 134 patients with melioidosis.

Characteristics	No. of patients (%)
Sex: male	93 (69.40)
Age in years	49 (34, 58)
Occupation: high risk	39 (29.10)
Underlying diseases	
At least 1 underlying disease	99 (73.88)
Diabetes mellitus	63 (47.01)
Chronic kidney disease	8 (5.97)
Thalassemia	7 (5.22)
Malignancy	11 (8.21)
CMT/Steroid/Immunosuppressant	14 (10.45)
Outpatient cases	14 (10.45)
Inpatient cases	120 (89.55)

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