MELIOIDOSIS : EPIDEMIOLOGY AND ANTIBIOGRAM OF CASES IN SINGAPORE

A L Tan, B S P Ang, Y Y Ong

ABSTRACT

There has been an increased incidence of melioidosis in Singapore. The disease affects mainly males, older patients and a disproportionately higher number of Indians and Malays. Possible predisposing illness include diabetes mellitus. Most patients are bacteraemic. Mortality rate is 72% for bacteraemic patients, as compared to 32% for non-bacteraemic patients. Local strains of *Pseudomonas pseudomallei* have been consistently sensitive to ceftazidime, chloramphenicol and piperacillin, and nearly always sensitive to tetracycline.

Keywords : Melioidosis, antibiotic susceptibility, epidemiology

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INTRODUCTION

Melioidosis in humans was first described in Burma in 1912 by Whitmore and Krishnaswamy [1]. This is an infection with protean manifestation caused by the bacteria *Pseudomonas pseudomallei*. The bacteria is an inhabitant of soil and water and is endemic in Southeast Asia and northern Australia [2-6]. Infection is thought to result from inoculation, inhalation or ingestion of environmental organisms [8]. Until recently, it was thought to be of minor importance, and generated little interest, with few literature written about it. However, it is now increasingly recognised as an important cause of morbidity and mortality in countries like Thailand [9]. We in Singapore have noticed a dramatic increase in melioidosis over the last 2 years. We review the epidemiological data of our cases, as well as present the antibiotic susceptibility pattern of our local cases.

MATERIAL AND METHOD

The Department of Pathology processes specimens from all government hospitals and outpatient clinics in Singapore, as well as some private requests.

All cases of *Pseudomonas pseudomallei* reported by the Bacteriology Section of the Department of Pathology, Singapore, from 1 January 1987 to 31 August 1989 were noted.

Department of Pathology
Singapore General Hospital
Outram Road
Singapore 0316

A L Tan, FRCPA
Registrar

Department of Medicine III
Singapore General Hospital

B S P Ang, M Med (Int Med)
Registrar

Y Y Ong, M Med (Int Med)
Associate Professor and Head

Correspondence to: Dr AL Tan

Information regarding these patients was analysed. Additional information about concomitant medical conditions from 33 patients from the Singapore General Hospital was obtained from case notes.

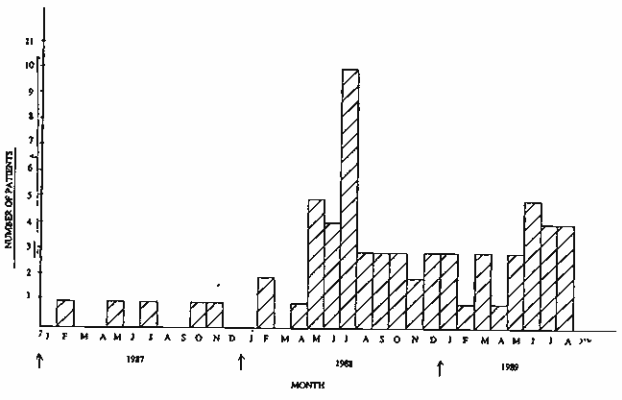
Antibiotic susceptibility testing was done by disk diffusion method [10].

RESULTS

Incidence

The monthly incidence is shown in Fig 1. Figures represent incidence of new patients,and do not include relapses. There were 5 cases in 1987, with a sharp increase to 36 in 1988 and 24 in 1989.

Fig 1
Incidence of *Pseudomonas pseudomallei* infections (Jan 1987 - Aug 1989)



Age distribution

A breakdown of the age groups is shown in Table I. The peak age group is 60-69 years. The youngest patient was 9 years, and the oldest 82 years.

Sex distribution

Sex distribution is shown in Table II. Males predominate in a 5:1 ratio.

Table I
Age Distribution

Age (years)	No. of patients
0 -9	1
10 - 19	5
20 - 29	5
30 - 39	5
40 - 49	8
50 - 59	15
60 - 69	16
70 - 79	5
80 - 89	4
unknown	1
Total	65

Table II
Sex Distribution

Sex	No. of patients
Male	54
Female	11
Total	65

Race

Breakdown of patients into Chinese, Malays and Indians is shown in Fig 2. Although the majority of patients were Chinese, a disproportionately higher number of Indian and Malay patients was noted when compared to the population distribution of Singapore.

Fig 2
Racial Distribution

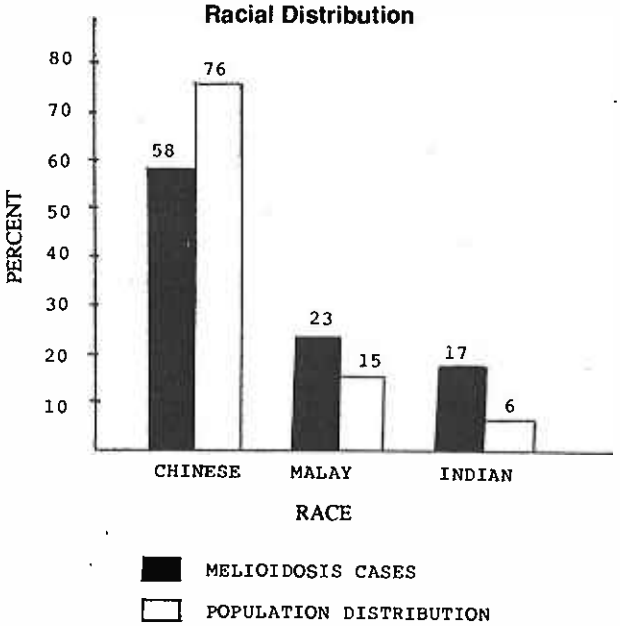


Table III
Concomitant Medical Illness

Illness	No. of patients
Diabetes mellitus	16 (49)
Carcinoma	2 (6)
Chronic renal failure	1 (13)
None	14 (42)
Total	33 (100)

* Figures in parentheses = %

Concomitant medical illness

Out of 33 patients studied from Singapore General Hospital,19 had concomitant medical illness as shown in Table III.

Occupation

There was no particular trend in the occupation of the 33 patients from Singapore General Hospital. None of them were involved in agricultural activities or construction work. However, 3 of the patients were otherwise healthy young men doing their National Service at the time they developed the disease.

Mortality

Forty-six of 65 patients were bacteraemic. Mortality rates for bacteraemic and non-bacteraemic patients are shown in Table IV. The mortality rate of bacteraemic patients is at least 72%, and non-bacteraemic patients at least 32%. The mortality rates may be higher because patients who were discharged well may have died from a relapse, without being readmitted or recognised. Although there were 19 cases of non-bacteraemic patients, some of them might have been bacteraemic, but blood cultures were not done in these patients. The overall mortality rate is 60%.

Table IV
Rate of Mortality

Outcome / Subgroup	Dead	Alive	Unknown	Total	Morality(%)
Bacteraemic	33	13	0	46	72
Non Bacteraemic	6	12	1	19	32
Total	39	25	1	65	60

Antibiogram

Results of antibiotic susceptibility test is shown in Table V.

Table V
Antibiogram of *Pseudomonas pseudomallei*

Antibiotic	No. of strains tested	% Sensitive
Ceftazidime	61	100
Chloramphenicol	54	100
Piperacillin	59	100
Ticarcillin	38	97
Augmentin	36	97
Minocin	39	97
Tetracycline	50	96
Ceftriaxone*	54	89 *
Cotrimoxazole	62	44
Netilmicin	40	30
Amikacin	59	8
Ampicillin	54	7
Cephalothin	52	2
Gentamicin	64	2

* Not reliable in vivo. Please see text

DISCUSSION

There has been a sharp increase in melioidosis in Singapore. This may be because of greater awareness and hence increased isolation rates by the laboratory. Nonetheless,the disease is not uncommon in Singapore. We speculate that one reason for the increase in melioidosis in the past 2 years may be due to excessive soil excavations in Singapore, hence creating aerosols and liberating the organisms into the air. The bacteria has been isolated from the soil and surface water in Singapore in several studies [5].

All age groups are affected, concurring with other reports [9]. Although most patients are elderly with possible predisposing factors, the disease also occurs in previously fit persons, as most of our younger patients were previously well.

The reason for male predominance is unknown. Could it be genetic factor or that traditionally, males were involved in activities which predispose to greater exposure?

The disproportionately higher number of Indians, and to a lesser extent, Malays, is very interesting. We speculate genetic factors or differences in lifestyle.

It is also interesting to note that of 33 patients analysed for concomitant medical illness, half of them had diabetes mellitus.

Not many studies have been written about antibiotic therapy of melioidosis. In general, septicaemic patients need parenteral antibiotics, often in combination and for prolonged periods, followed by a further period of oral therapy. Local strains have been consistently sensitive to ceftazidime and chloramphenicol, and nearly always sensitive to tetracycline, drugs which are commonly used for treating melioidosis in Singapore. Cotrimoxazole, a drug which is used in some series [11],is found not to be consistently effective against local strains. Also, in our experience, although 89% of the strains are sensitive to ceftriaxone in vitro, patients do not respond well in vivo. Hence ceftriaxone should not be used.

Although figures are not presented here, relapse rate is high, even after many years,and despite apparently adequate therapy. To emphasise this point, the cliche, "once a melioidosis, always a melioidosis", could probably be applied here. Hence, all cases of melioidosis should be closely followed up for a prolonged period of time.

As this is a disease with protean manifestation, and because of high mortality and an increased incidence in Singapore, it has to be thought of, and treated aggressively.

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