

Phenotype and Virulence Assessment of a *Burkholderia pseudomallei* Soil Isolate from Malaysia

(Penilaian Fenotip dan Kevirulenan Pencilan Tanah *Burkholderia pseudomallei* dari Malaysia)

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ABSTRACT

Burkholderia pseudomallei, a Gram-negative soil saprophyte, is the causative agent of life-threatening melioidosis. *B. pseudomallei* from soil and water remains a common source of human and animal infection via skin abrasions, ingestion or inhalation. Despite the reported sero-prevalence in healthy individuals among Malaysian rice farmers, there are limited reports on *B. pseudomallei* isolated from water or soil around the country. In this study, we characterized a *B. pseudomallei* soil isolate and compared it to local clinical isolates. 16s rRNA sequencing was adopted to confirm the identity of the soil isolate, NC20. *B. pseudomallei* NC20 colony morphology, in vitro growth rate and antibiotic sensitivity were examined and compared to two *B. pseudomallei* clinical isolates, UM6 and D286. Virulence properties such as biofilm formation and infection in a nematode host were also examined. The soil isolate NC20 exhibited distinguishable features of *B. pseudomallei*, comparable growth rate and similar antibiotic resistance profile to UM6 and D286. Additionally, NC20 is a medium-level biofilm producer with levels similar to D286, where the amount of biofilm produced was much less relative to UM6. Interestingly, NC20 exhibited weaker killing of the *Caenorhabditis elegans* infection model relative to the clinical isolates. The comparison between soil-derived and clinical isolates of *B. pseudomallei* demonstrated that both soil and clinical isolates shared certain phenotypic properties but the soil isolate was somewhat less virulent than the clinical isolates used in this study.

Keywords: *B. pseudomallei*; biofilm; soil isolate; virulence

ABSTRAK

Burkholderia pseudomallei, bakteria Gram negatif saprofit tanah, ialah agen penyebab penyakit melioidosis. *B. pseudomallei* daripada tanah dan air ialah sumber utama jangkitan manusia dan haiwan melalui lecetan kulit, pengingesan atau pernafasan. Walaupun terdapat laporan kelaziman kehadiran antibodi pada individu sihat di kalangan pesawah padi tempatan, laporan pemencilan *B. pseudomallei* daripada tanah atau perairan di seluruh negara masih terhad. Di dalam kajian ini, kami telah mencirikan satu pencilan *B. pseudomallei* dari tanah dan seterusnya membandingkannya dengan pencilan klinikal *B. pseudomallei* tempatan. Penjujukan 16s rRNA telah digunakan bagi menentusahkan identiti pencilan tanah tersebut yang dinamakan NC20. Analisis morfologi koloni, lengkungan pertumbuhan bakteria in vitro serta analisis sensitiviti terhadap antibiotik dilakukan ke atas *B. pseudomallei* NC20 dan dibandingkan dengan pencilan klinikal *B. pseudomallei*, UM6 dan D286. Ciri kevirulenan seperti pembentukan biofilem dan jangkitan terhadap perumah nematod juga telah dijalankan. Pencilan tanah NC20 menunjukkan ciri yang mirip *B. pseudomallei*, menunjukkan kadar pertumbuhan bakteria yang serupa serta profil kerintangan antibiotik yang sama dengan UM6 dan D286. Tambahan pula, NC20 adalah pembentuk biofilem sederhana setara dengan D286 dengan kadar pembentukan biofilem adalah lebih rendah berbanding UM6. Menariknya, NC20 menunjukkan kadar pembunuhan model jangkitan *Caenorhabditis elegans* yang lemah apabila dibandingkan dengan pencilan klinikal. Perbandingan antara pencilan tanah dan klinikal *B. pseudomallei* menunjukkan kedua-dua pencilan tanah dan klinikal berkongsi ciri fenotip tertentu, tetapi bakteria pencilan tanah mempunyai tahap kevirulenan yang lebih rendah berbanding pencilan klinikal yang digunakan dalam kajian ini.

Kata kunci: *B. pseudomallei*; biofilem; kevirulenan; pencilan tanah