# INTISARI

**Latar Belakang:** Infeksi sistem saraf pusat merupakan salah satu penyebab umum morbiditas, mortalitas dan kenaikan angka rawat inap di Rumah Sakit. Infeksi bakteri dan nonbakteri perlu ditegakkan segera untuk efektivitas dan efisiensi penggunaan antibiotik. Penegakkan diagnosis infeksi SSP yang selama ini dilakukan adalah analisis CSS (jumlah leukosit CSS, persentase PMN CSS, kadar glukosa CSS, kadar protein CSS) dan memiliki keterbatasan, diharapkan pemeriksaan kadar laktat cairan serebrospinal dapat menjadi salah satu petunjuk penyebab bakteri yang selanjutnya memandu pemberian terapi antibiotik empiris.

**Tujuan:** Mengevaluasi peran laktat cairan serebrospinal sebagai pembeda penyebab bakteri atau non bakteri infeksi sistem saraf pusat di RSUP Dr. Sardjito

**Metode:** Penelitian adalah studi observasional analitik potong lintang. Infeksi bakteri ditetapkan berdasarkan ditemukannya patogen pada hasil kultur CSS atau bila hasil kultur negatif/flora kontaminasi maka penyebab bakteri ditetapkan berdasarkan minimal dua dari tiga hasil analisis CSS positif yaitu pleositosis (sel polimorfonuklear $\geq 80\%$), protein $>0,045$ g/dL dan glukosa $<50$ mg/dL. Analisis statistik menggunakan SPSS versi 26.

**Hasil:** Penelitian melibatkan 86 subjek dengan rerata usia pasien 37,5 tahun. Median kadar laktat CSS 2,44 mmol/L (0,35-13,4 mmol/L). Hasil analisis ROC kadar laktat cairan serebrospinal dihubungkan dengan penyebab bakteri infeksi SSP memberikan AUC=0,792 (p=0,001, IK95% 0,67-0,92). Pada kadar laktat CSS $\geq 2,72$ mmol/L didapatkan rasio prevalensi penyebab bakteri infeksi SSP 3,82 (p=0,001, IK 95% 1,65-8,88). Pada analisis variabel lain yang berhubungan dengan penyebab bakteri infeksi SSP didapatkan hasil peningkatan jumlah leukosit CSS $\geq 100$ sel/µL (rasio prevalensi 3,04, p=0,012), glukosa CSS (rasio prevalensi 4,21, p=0,001) dan protein CSS (rasio prevalensi 2,89, p=0,040). Berdasarkan analisis multivariat ditemukan OR kadar laktat CSS 7,20 (p=0,001, IK 95% 2,30-22,54) dan OR jenis kelamin 3,81 (p=0,043, IK 95% 1,04-13,98)

**Simpulan:** Kadar laktat cairan serebrospinal dapat menjadi pembeda penyebab bakteri atau non bakteri infeksi sistem saraf pusat.

**Kata Kunci:** infeksi sistem saraf pusat, laktat cairan serebrospinal, infeksi bakteri, infeksi non bakteri

# ABSTRACT

**Background:** Central nervous system infections are one of the common causes of morbidity, mortality and increased hospital admissions. Bacterial and non-bacterial infections need to be established promptly for effective and efficient use of antibiotics. The current diagnosis of CNS infection is based on CSF analysis (CSF leucocyte count, CSF PMN percentage, CSF glucose level, CSF protein level) and has limitations. it is hoped that the examination of cerebrospinal fluid lactate levels can be one of the clues to the bacterial cause which further guides the administration of empirical antibiotic therapy.

**Objective:** To evaluate the role of cerebrospinal fluid lactate to distinguish bacterial from non-bacterial of central nervous system infection at Dr Sardjito Hospital.

**Methods:** The study was a cross-sectional analytical observational study. Bacterial infection was determined based on the discovery of pathogens in CSS culture results or if the culture results were negative/flora contamination, the bacterial cause was determined based on at least two of the three positive CSS analysis results, namely pleocytosis (polymorphonuclear cells ≥80%), protein >0.045 g/dL and glucose <50 mg/dL. Statistical analysis was performed using SPSS version 26.

Results: The study included 86 subjects with a mean patient age of 37.5 years. The median CSS lactate level was 2.44 mmol/L (0.35-13.4 mmol/L). The results of ROC analysis of cerebrospinal fluid lactate levels associated with bacterial causes of CNS infection gave AUC=0.792 (p=0.001, IK95% 0.67-0.92). For CSS lactate levels ≥2.72 mmol/L, the prevalence ratio of bacterial CNS infection was 3.82 (p=0.001, 95% CI 1.65-8.88). In the analysis of other variables associated with the cause of bacterial CNS infection, the results showed an increase in CSS leukocyte count ≥100 cells/µL (prevalence ratio 3.04, p=0.012), CSS glucose (prevalence ratio 4.21, p=0.001) and CSS protein (prevalence ratio 2.89, p=0.040). Based on multivariate analysis, the OR of CSS lactate level was 7.20 (p=0.001, 95% CI 2.30-22.54) and OR of gender was 3.81 (p=0.043, 95% CI 1.04-13.98).

**Conclusion:** Cerebrospinal fluid lactate level can be used as a marker to differentiate the cause of bacterial or non-bacterial infection in the central nervous system.

Keywords: central nervous system infection, cerebrospinal fluid lactate, bacterial infection, non-bacterial infection