

## INTISARI

**Latar belakang:** Infeksi saluran kemih (ISK) merupakan penyakit infeksi yang sering ditemukan di negara berkembang. ISK menempati peringkat kedua infeksi tersering pada pasien rawat inap di rumah sakit. Kultur urin masih merupakan baku emas untuk mendiagnosis ISK. Keterbatasan pemeriksaan kultur antara lain waktu pemeriksaan yang lama, relatif mahal, dikerjakan oleh tenaga terlatih, tidak tersedia di semua fasilitas kesehatan, dan hasil negatif atau tidak ada pertumbuhan mikroorganisme yang cukup tinggi. Pemeriksaan alternatif yang dapat dilakukan sebelum didapatkan hasil kultur urin adalah dengan mendeteksi adanya leukosit dalam urin yang merupakan peran sistem imun dalam melawan infeksi mikroorganisme yaitu melalui aktivasi dan mobilisasi sel *polymorphonuclear* (PMN) dan makrofag ke tempat infeksi. Adanya leukosit dalam urin diharapkan dapat dipertimbangkan sebagai salah satu parameter untuk diagnosis dini ISK.

**Tujuan:** Mengetahui nilai diagnostik leukosit esterase dan hitung leukosit urin metode *flow cytometry* diagnosis dini ISK.

**Metode:** Penelitian ini adalah uji diagnostik dengan desain potong lintang menggunakan data rekam medis pasien dewasa suspek ISK di RSUP Dr. Sardjito Yogyakarta pada bulan Januari sampai Mei 2021. Berdasarkan pemeriksaan leukosit esterase subjek penelitian dibagi menjadi 2 kelompok yaitu negatif (negatif dan *trace*) dan positif (1+, 2+, dan 3+). Selanjutnya dilakukan penilaian penampilan diagnostik menggunakan tabel 2x2 dengan standar rujukan kultur urin. Kurva ROC digunakan untuk mencari *cut-off* hitung leukosit urin paling optimal. Analisis statistik menggunakan SPSS 24.0 dan STATA 15.1.

**Hasil:** Sebanyak 198 pasien dewasa dengan kecurigaan ISK memenuhi kriteria inklusi. Subjek terbanyak adalah wanita (61,1%). Kultur urin positif pada 115 subjek (58%). *Escherichia coli* merupakan bakteri terbanyak penyebab ISK (24,3%). Sensitivitas, spesifisitas, nilai ramal positif (NRP), nilai ramal negatif (NRN), *positive likelihood ratio* (LR+), dan *negative likelihood ratio* (LR-) berturut-turut untuk leukosit esterase adalah 96,5%, 54,2%, 74,5%, 91,8%, 2,1, dan 0,06. Berdasarkan analisis kurva ROC didapatkan *area under the curve* (AUC) hitung leukosit urin metode *flow cytometry* sebesar 0,753 dan diperoleh *cut-off* optimal  $>111/\mu\text{L}$  dengan sensitivitas sebesar 80,0%, spesifisitas 62,6%, NRP 40,3%, NRN 90,8%, LR+ 2,14, dan LR- 0,32.

**Simpulan:** Parameter leukosit esterase memiliki sensitivitas 96,5% dan spesifisitas 54,2%, dan parameter hitung leukosit urin metode *flow cytometry* dengan *cut-off* optimal  $>111/\mu\text{L}$  memiliki sensitivitas 80,0% dan spesifisitas 62,2% untuk skrining ISK dibandingkan dengan baku emas kultur urin.

**Kata kunci:** nilai diagnostik, leukosit esterase, hitung leukosit urin *flow cytometry*, ISK

## ABSTRACT

**Background:** Urinary tract infection (UTI) is an infectious disease often found in developing countries. UTI is the second most common infection in hospitalized patients. Urine culture is still the gold standard for diagnosing UTIs. The limitations of culture examinations include the long examination time, relatively expensive, carried out by trained personnel, not available in all healthcare facilities, and negative results or no growth of microorganisms that are high enough. An alternative examination that can be done before urine culture results are obtained is to detect the presence of leukocytes in the urine (pyuria). Pyuria is the role of the immune system in fighting microorganism infections, namely through activation and mobilization of polymorphonuclear cells (PMN) and macrophages to the site of infection. The presence of leukocytes in the urine is expected to be considered one of the parameters for diagnosing UTI.

**Objective:** To determine the diagnostic value of leukocyte esterase and urine leukocyte count by flow cytometry to diagnose UTI.

**Method:** Diagnostic study with a cross-sectional design was conducted using medical records of adult patients suspected of having UTIs in Dr. Sardjito Hospital Yogyakarta from January to May 2021. Subjects were divided into two groups based on the results of the leukocyte esterase examination, namely negative (negative and trace) and positive (1+, 2+, and 3+). Furthermore, the diagnostic performance assessment was carried out using a 2x2 table with urine culture as the reference standard. To obtain the optimal cut-off of urine leukocyte count using the ROC curve. Statistical analysis used SPSS 24.0 and STATA 15.1.

**Result:** This study was conducted on 198 adult patients who met the inclusion criteria. Most of the subjects were women (61.1%). Positive urine cultures were found in 115 subjects (58.0%). *Escherichia coli* is the most common bacteria that cause UTIs (24.3%). The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+), and negative likelihood ratio (LR-) for leukocyte esterase were 96.5%, 53.6%, 74.5%, 91.8%, 2.1, and 0.06, respectively. Based on ROC curve analysis, the area under the curve (AUC) of urine leukocyte count using the flow cytometry method was 0.753, and by using a cut-off point  $>111/\mu\text{L}$ , it gave a sensitivity result of 80.0%, specificity of 62.6%, PPV 40.3%, NPV 90.8%, LR+ 2.14, and LR- 0.32

**Conclusion:** Leukocyte esterase had a sensitivity of 96.5% and specificity of 54.2%, and urine leukocyte count with a cut-off point  $>111/\mu\text{L}$  had a sensitivity of 80.0% and specificity of 62.6% for UTI screening compared to the gold standard of urine culture.

**Keywords:** *diagnostic value, leukocyte esterase, urine leukocyte count, urinary tract infection*