

# Evaluasi Pemeriksaan Mikroskopik Langsung pada Spesimen Swab Tenggorok untuk Menunjang Diagnosis Dini Difteri = Evaluation of Direct Microscopic Examination on Throat Swab Specimens to Support Early Diagnosis of Diphtheria

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## Abstrak

Latar belakang: Infeksi *C. diphtheriae* toksigenik memerlukan penanganan segera karena dapat mengancam nyawa. Pemeriksaan kultur sebagai uji baku emas hanya dapat dilakukan di laboratorium rujukan dan memakan waktu lama. Pemeriksaan awal yang dapat dilakukan adalah menggunakan teknik pewarnaan. Pewarnaan khusus difteri seperti Albert atau Neisser dapat menggambarkan granul metakromatik yang spesifik terhadap *Corynebacterium* sp., namun laboratorium yang mampu mengerjakannya sangat terbatas. Oleh karena itu, berbagai laboratorium menggunakan teknik pewarnaan Gram sebagai alternatif untuk menunjang diagnosis dini difteri.

Tujuan: Evaluasi pemeriksaan mikroskopik langsung yang rutin dilakukan pada spesimen swab tenggorok untuk menunjang diagnosis dini difteri.

Metode: Uji diagnostik dengan desain potong lintang. Pemeriksaan mikroskopik Gram dan pewarnaan khusus Albert serta Neisser dibandingkan dengan kultur sebagai baku emas untuk mendapatkan nilai sensitivitas, spesifisitas, nilai duga positif, nilai duga negatif, dan akurasi. Uji kesesuaian antara kedua teknik pewarnaan dan PCR dinilai menggunakan koefisien Kappa. Analisis multivariat dilakukan pada variabel independen data faktor risiko dan gambaran klinis. Nilai probabilitas yang dihasilkan dimasukkan ke dalam kurva Receiver Operating Characteristic (ROC). Pertambahan luas Area Under Curve (AUC) dinilai setelah menambahkan pemeriksaan mikroskopik ke dalam model.

Hasil: Pewarnaan khusus difteri dan Gram memiliki sensitivitas 70% dan 20%, spesifisitas 83,72% dan 79,06%, nilai duga positif 33,33% dan 10%, nilai duga negatif 96% dan 89,47% serta akurasi 82,29% dan 72,92%. Kesesuaian minimal antara kedua metode pewarnaan (reliabilitas 4-15%). Pewarnaan khusus difteri memiliki kesesuaian yang lebih baik dengan uji PCR, dibandingkan dengan pewarnaan Gram. Pewarnaan khusus difteri menunjukkan penambahan nilai diagnostik sebesar 3,8% pada model faktor risiko dan gambaran klinis yang bermakna untuk menunjang diagnosis dini difteri.

Kesimpulan: Pewarnaan khusus difteri pada spesimen klinis langsung untuk diagnosis dini difteri tidak dapat digantikan dengan pewarnaan Gram.

.....Background: Infection caused by toxigenic *C. diphtheriae* requires immediate treatment because it can be life threatening. Culture examination as gold standard can only be done in a reference laboratory and is time-consuming. The initial examination can be performed using the staining technique. Diphtheria special staining such as Albert or Neisser can characterize metachromatic granules that are specific to *Corynebacterium* sp., but the availability of these stains in many laboratories are limited. Therefore most laboratories use Gram staining technique as an alternative to support early diagnosis of diphtheria.

Objective: Evaluation of the direct microscopic examination commonly used on throat swab specimens to support the early diagnosis of diphtheria.

Methods: Diagnostic test with a cross-sectional design. Gram microscopic examination and special staining

of Albert and Neisser were compared with culture examination as the gold standard to obtain sensitivity, specificity, positive predictive value, negative predictive value, and accuracy. The reliability test between the two staining and PCR techniques was assessed using the Kappa coefficient. Multivariate analysis was performed on the independent variables of risk factors and clinical features data. The resulting probability value was entered into the Receiver Operating Characteristic (ROC) curve. The improvement of the area under the curve (AUC) was assessed after microscopic examination was added on the model.

Results: Diphtheria and Gram staining had a sensitivity of 70% and 20%, specificity 83.72% and 79.06%, positive predictive value 33.33% and 10%, negative predictive value 96% and 89.47% and accuracy 82.29% and 72.92%. Minimal concordance was found between the two staining methods (4-15%). Diphtheria-specific staining have better reliability result, compared to the PCR test, than Gram staining. Diphtheria special staining showed an additional 3.8% diagnostic value, in the significant of risk factors and clinical features model, to support the early diagnosis of diphtheria.

Conclusion: Diphtheria special staining directly on clinical specimens for early diagnosis of diphtheria cannot be replaced by Gram staining.