

CASTOR OIL SEBAGAI ALTERNATIF *IMMERSION OIL* UNTUK PEMERIKSAAN BAKTERI *MYCOBACTERIUM TUBERCULOSIS*

Ade Ulii Nuha¹, Sujono, SKM., M.Sc²., Menik Kasiyati, S.ST, M.Imun.³
Jurusan Teknologi Laboratorium Medis, Poltekkes Kemenkes Yogyakarta,
Jl. Ngadinegaran MJ 3 No. 62, Mantrijeron, Kota Yogyakarta, 55141
Email : adeulinnuha@gmail.com

ABSTRAK

Latar belakang : *Mycobacterium tuberculosis* merupakan bakteri penyebab tuberkulosis yang dapat diidentifikasi melalui pemeriksaan mikroskopis Basil Tahan Asam (BTA) menggunakan pewarnaan Ziehl Neelsen. Pengamatan mikroskopis dengan objektif 100× membutuhkan bantuan *immersion oil* untuk meningkatkan transmisi cahaya, resolusi dan ketajaman citra melalui pengurangan pembiasan cahaya antara preparat dan lensa objektif. *Castor oil* memiliki karakteristik fisik dan optik yang berpotensi digunakan sebagai media imersi alternatif.

Tujuan penelitian: Mengetahui potensi penggunaan *castor oil* sebagai alternatif *immersion oil* standar berdasarkan kualitas visualisasi mikroskopis *Mycobacterium tuberculosis* pada preparat BTA.

Metode Penelitian: Penelitian ini merupakan penelitian deskriptif kualitatif dengan pendekatan observasional laboratorium.

Hasil Penelitian: Hasil pengujian menunjukkan bahwa *castor oil* memiliki nilai indeks bias sebesar 1,4786 berdasarkan pengujian BPSMB Surakarta sesuai SNI 01-1904-1990. *Castor oil* memiliki karakteristik fisik berupa cairan homogen, jernih, transparan, dan memiliki viskositas yang mendukung pembentukan lapisan medium imersi. Hasil pengamatan mikroskopis menunjukkan bahwa penggunaan *castor oil* mampu menghasilkan visualisasi *Mycobacterium tuberculosis* berbentuk batang merah dengan latar belakang biru yang dapat diamati dengan baik. Berdasarkan parameter visualisasi, *castor oil* mampu mempertahankan resolusi, kontras, dan ketajaman citra, meskipun intensitas gambar masih sedikit lebih rendah dibandingkan *immersion oil* standar.

Kesimpulan: *Castor oil* berpotensi digunakan sebagai alternatif *immersion oil* pada pemeriksaan mikroskopis *Mycobacterium tuberculosis* preparat BTA. Karakteristik indeks bias, kejernihan, dan kemampuan mempertahankan kualitas visualisasi menunjukkan bahwa *castor oil* dapat menjadi media imersi alternatif, terutama pada laboratorium dengan keterbatasan ketersediaan *immersion oil* standar.

Kata kunci: *Mycobacterium tuberculosis*, *castor oil*, *immersion oil*.

CASTOR OIL AS AN ALTERNATIVE IMMERSION OIL FOR MICROSCOPIC EXAMINATION OF MYCOBACTERIUM TUBERCULOSIS

Ade Ulii Nuha¹, Sujono, SKM., M.Sc²., Menik Kasiyati, S.ST, M.Imun.³
Jurusan Teknologi Laboratorium Medis, Poltekkes Kemenkes Yogyakarta,
Jl. Ngadinegaran MJ 3 No. 62, Mantrijeron, Kota Yogyakarta, 55141
Email : adeulinnuha@gmail.com

ABSTRAK

Background: *Mycobacterium tuberculosis* is the causative agent of tuberculosis and can be identified through Acid-Fast Bacilli (AFB) microscopic examination using Ziehl Neelsen staining. Microscopic observation with a 100× objective requires immersion oil to improve light transmission, resolution, and image sharpness by reducing light refraction between the specimen and objective lens. However, limited availability and the high cost of standard immersion oil have encouraged the development of natural-based alternatives. *Castor oil* possesses physical and optical characteristics that may support its use as an alternative immersion medium.

Objective: To evaluate the potential use of *castor oil* as an alternative to standard immersion oil based on the microscopic visualization quality of *Mycobacterium tuberculosis* in AFB smears.

Methods: This study employed a descriptive qualitative design with a laboratory observational approach. Positive AFB smears of *Mycobacterium tuberculosis* were observed using a light microscope with a 100× objective using two immersion media: standard immersion oil and castor oil. Visualization quality was descriptively evaluated based on resolution, contrast, bacilli sharpness, and background clarity. The optical characteristics of *castor oil* were analyzed based on its refractive index value.

Results: The refractive index of castor oil was 1.4786 based on testing conducted by BPSMB Surakarta according to SNI 01-1904-1990. *Castor oil* showed physical characteristics of a homogeneous, clear, and transparent liquid with viscosity supporting the formation of an immersion layer. Microscopic observation demonstrated that castor oil produced clear visualization of red rod-shaped *Mycobacterium tuberculosis* against a blue background. *Castor oil* was able to maintain image resolution, contrast, and sharpness, although the overall image intensity was slightly lower compared with standard immersion oil.

Conclusion: *Castor oil* has potential as an alternative immersion oil for microscopic examination of *Mycobacterium tuberculosis* in AFB smears. Its refractive index, transparency, and ability to maintain visualization quality support its application as an alternative immersion medium, particularly in laboratories with limited access to standard immersion oil.

Keywords: *Mycobacterium tuberculosis*, *castor oil*, *immersion oil*.