THE EFFECT OF DIFFERENT CONCENTRATIONS OF EXPIRED PACKED RED CELLS IN BLOOD AGAR PLATE MEDIA ON THE GROWTH AND HEMOLYSIS ZONE OF *STREPTOCOCCUS PYOGENES*

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ABSTRACT

Background: Bacterial culture is an essential method in clinical microbiological diagnosis. Blood agar media is universal and differential. The addition of 5–10% sheep blood is the gold standard. Packed Red Cell (PRC) products contains viable erythrocytes that have potential as an alternative blood source. PRC has a higher erythrocyte density compared to whole blood; therefore, its concentration is reduced to 2.5% and 5% to match the standard. This study aims to examine the potential of expired donor PRC at these concentrations as a substitute in blood agar media. *Streptococcus pyogenes* ATCC was used as the test bacterium based on its characteristic β-hemolysis properties.
Objective: To evaluate the performance of Blood Agar Plate (BAP) medium supplemented with 2.5% and 5% Packed Red Cells (PRC) in comparison to 5% sheep blood BAP as the reference standard.
Methods: This study employed an experimental design using completely randomized design with post test only control group approach. The investigation was conducted in accordance with ISO 11133:2014 guidelines. Media performance was assessed based on productivity ratio calculation and the formation of hemolytic zones (clear zones).
Results: The performance of the Blood Agar Plate medium was evaluated based on colony growth and differential characteristics (hemolysis zone formation). The productivity ratio of BAP PRC 2.5% was calculated at 0.99, and BAP PRC 5% at 1.13 ($Pr \geq 0.70$). All colonies grown on BAP PRC 2.5% and 5% replicates exhibited clear zones (β-hemolysis); however, colonies on BAP PRC 5% medium produced comparatively narrower hemolysis zones, thereby fulfilling the qualitative and quantitative criteria as specified by ISO 11133:2014.
Conclusion: BAP media supplemented with 2.5% and 5% PRC demonstrated comparable performance to 5% sheep blood BAP, indicating their suitability as alternative media for bacterial culture.

Keywords: *Blood Agar Plate, Expired Packed Red Cell, Streptococcus pyogenes, ISO 11133:201*

PERBEDAAN KONSENTRASI *PACKED RED CELL* KEDALUWARSA PADA MEDIA *BLOOD AGAR PLATE* TERHADAP PERTUMBUHAN DAN ZONA HEMOLISIS BAKTERI *STREPTOCOCCUS PYOGENES*

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ABSTRAK

Latar Belakang: Kultur bakteri adalah metode esensial diagnosis mikrobiologi klinis. Media agar darah bersifat universal dan diferensial. Penambahan darah domba 5–10% adalah gold standard. *Packed Red Cell* (PRC) mengandung eritrosit *viable* berpotensi sebagai sumber darah alternatif. PRC memiliki densitas eritrosit lebih tinggi dibandingkan *whole blood*, konsentrasinya diturunkan menjadi 2,5% dan 5% agar setara dengan standar. Penelitian ini bertujuan mengkaji potensi PRC darah donor kedaluwarsa konsentrasi sebagai substituen dalam media agar darah. *Streptococcus pyogenes* ATCC sebagai bakteri uji berdasarkan karakteristik β-hemolisisnya yang khas.

Tujuan: Penelitian ini bertujuan mengetahui performa media BAP PRC 2,5% dan 5% dengan pembanding BAP domba 5%.

Metode: Penelitian ini menggunakan desain eksperimental dengan rancangan acak lengkap. Desain penelitian ini adalah *post-test only group* . Penelitian ini menggunakan pedoman ISO 11133:2014. Performa media BAP didasarkan perhitungan rasio produktivitas dan terbentuknya zona hemolisis (*clear zone)*.

Hasil: Performa media *Blood Agar Plate* dilihat berdasarkan pertumbuhan koloni dan sifat diferensial (pembentukan zona hemolisis). Perhitungan rasio produktivitas BAP PRC 2,5% sebesar 0,99 dan BAP PRC 5% sebesar 1,13 (Pr≥ 0,7). Semua koloni yang tumbuh pada replikasi BAP PRC 2,5% dan 5% membentuk zona bening (β-hemolisis), meskipun pada media BAP PRC 5% membentuk zona hemolisis yang lebih sempit, sehingga memenuhi kualitatif dan kuantitatif menurut ISO 11133:2014.

Kesimpulan : Media BAP PRC 2,5% dan 5% memiliki performa yang sebanding dengan BAP Domba 5% sehingga dapat digunakan sebagai media alternatif kultur bakteri.

Kata Kunci: *Blood Agar Plate, Packed Red Cell Kedaluwarsa, Streptococcus pyogenes , ISO 11133:2014*