

SKRIPSI SARJANA FARMASI

**FORMULASI *PATCH* SUPERNATAN BEBAS SEL *Pediococcus acidilactici*
BK01 DAN UJI AKTIVITAS ANTIJERAWAT TERHADAP
*Cutibacterium acnes***



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ABSTRAK

FORMULASI *PATCH* SUPERNATAN BEBAS SEL *Pediococcus acidilactici* BK01 DAN UJI AKTIVITAS ANTIJERAWAT TERHADAP *Cutibacterium acnes*

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Jerawat merupakan peradangan kulit yang dapat disebabkan oleh infeksi *Cutibacterium acnes*. Supernatan bebas sel (SBS) *Pediococcus acidilactici* BK01 mengandung asam laktat, bakteriosin, dan hidrogen peroksida yang berpotensi sebagai antibakteri pada jerawat. Penelitian ini bertujuan untuk memformulasikan SBS *Pediococcus acidilactici* BK01 menjadi *patch* serta mengevaluasi aktivitas antibakterinya terhadap *Cutibacterium acnes*. Aktivitas antibakteri dan konsentrasi hambat minimum (KHM) SBS *Pediococcus acidilactici* BK01 diuji menggunakan metode difusi sumuran. SBS *Pediococcus acidilactici* BK01 diformulasi menjadi *patch* dari hasil penentuan KHM. *Patch* dibuat menggunakan metode *solvent casting* dengan bahan aktif SBS *Pediococcus acidilactici* BK01, polimer, dan *plasticizer*. Polimer yang digunakan adalah hidroksipropil metilselulosa (HPMC) K4M dan polivinil alkohol (PVA) dengan konsentrasi 2, 3, dan 4%. *Plasticizer* yang digunakan adalah gliserin, propilen glikol dan polietilen glikol (PEG) 400 dengan konsentrasi 0,2; 0,4; dan 0,6%. *Patch* yang terbentuk diuji aktivitas antibakterinya terhadap *Cutibacterium acnes* dan *patch* terpilih kemudian dievaluasi organoleptis, ketebalan, ketahanan lipat, pH, kandungan lembab, dan *tensile strength*. Hasil penelitian menunjukkan KHM SBS *Pediococcus acidilactici* BK01 adalah 6,25%. PVA 4% dan gliserin 0,6% terpilih kemudian diformulasikan menjadi *patch* dengan konsentrasi SBS *Pediococcus acidilactici* BK01 75; 65; 50; 25; 12,5; dan 6,25% berdasarkan hasil penentuan KHM. Hasil uji aktivitas antibakteri terpilih *patch* 65% SBS *Pediococcus acidilactici* BK01 terhadap *Cutibacterium acnes* ATCC 11827 sebesar $12,03 \pm 0,373$ mm, termasuk kategori kuat. *Patch* memiliki ketebalan $0,095 \pm 0,006$ mm; jumlah lipatan > 500 kali lipatan; pH $4,76 \pm 0,02$; kandungan lembab $4,50 \pm 0,281\%$; dan *tensile strength* $6,057 \pm 1,019$ MPa. Dengan demikian, *patch* SBS *Pediococcus acidilactici* BK01 65% memiliki potensi sebagai antijerawat

Kata kunci: jerawat, supernatan bebas sel, *Pediococcus acidilactici*, *patch*

ABSTRACT

FORMULATION PATCH OF *Pediococcus acidilactici* BK01 CELL-FREE SUPERNATANT AND ANTIACNE ACTIVITY TEST AGAINST *Cutibacterium acnes*

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Acne is a skin inflammation that can be caused by infection with *Cutibacterium acnes*. The cell-free supernatant (CFS) of *Pediococcus acidilactici* BK01 contains lactic acid, bacteriocins, and hydrogen peroxide, which have potential as antibacterial agents against acne. This study aimed to formulate the CFS of *Pediococcus acidilactici* BK01 into a patch and evaluate its antibacterial activity against *Cutibacterium acnes*. The antibacterial activity and minimum inhibitory concentration (MIC) of the CFS were tested using the well diffusion method. The CFS was then formulated into a patch using the solvent casting method based on the MIC results. Hydroxypropyl methylcellulose (HPMC) K4M and polyvinyl alcohol (PVA) were used as polymers at concentrations of 2%, 3%, and 4%. Glycerin, propylene glycol, and polyethylene glycol (PEG) 400 were used as plasticizers at concentrations of 0.2%, 0.4%, and 0.6%. The resulting patches were tested for pH and antibacterial activity against *Cutibacterium acnes*. The selected patch was further evaluated for its organoleptic properties, thickness, folding endurance, moisture content, and tensile strength. The results showed that the MIC of the *Pediococcus acidilactici* BK01 CFS was 6.25%. A combination of 4% PVA and 0.6% glycerin was selected for the formulation of patches containing CFS at concentrations of 75%, 65%, 50%, 25%, 12.5%, and 6.25%. Based on the pH and antibacterial activity evaluation against *Cutibacterium acnes* ATCC 11827, the patch containing 65% CFS was selected, which showed an inhibition zone diameter of 12.03 ± 0.373 mm, categorized as strong. This patch had a thickness of 0.095 ± 0.006 mm; folding endurance of more than 500 folds; pH of 4.76 ± 0.02 ; moisture content of $4.50 \pm 0.281\%$; and tensile strength of 6.057 ± 1.019 MPa. Therefore, the 65% *Pediococcus acidilactici* BK01 CFS patch demonstrates potential as an anti-acne treatment.

Keywords: acne, cell-free supernatant, *Pediococcus acidilactici*, patch.