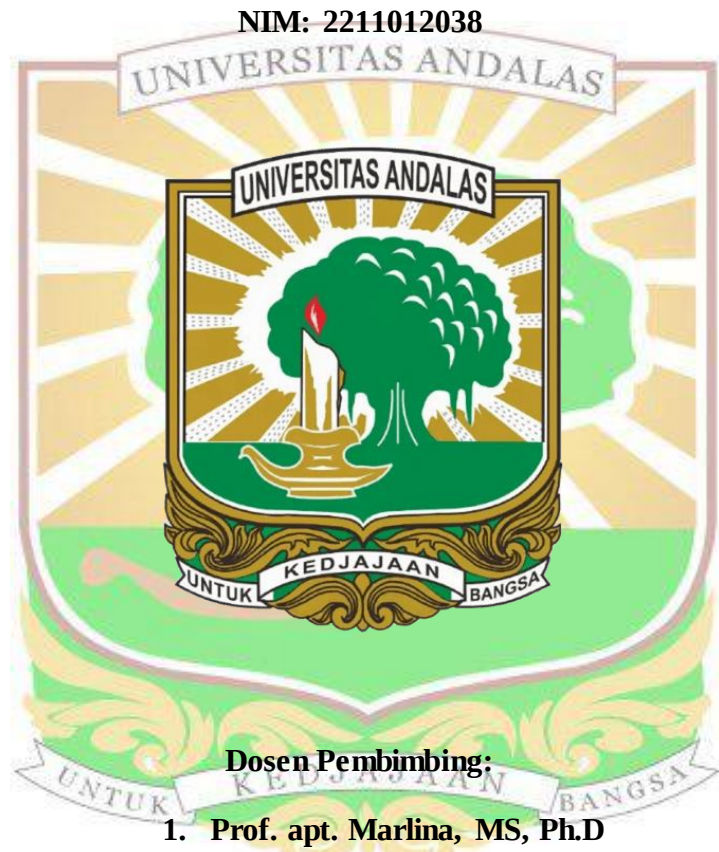


**UJI EFEKTIVITAS SEDIAAN PATCH SEKRETOM MESENCHYMAL
STEM CELL TERHADAP EKSPRESI GEN TNF- α PADA LUKA
BAKAR TIKUS (*Rattus norvegicus*) DENGAN
METODE RT-qPCR**

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PADANG

2026

ABSTRAK

UJI EFEKTIVITAS SEDIAAN PATCH SEKRETOM MESENCHYMAL STEM CELL TERHADAP EKSPRESI GEN TNF- α PADA LUKA BAKAR TIKUS (*Rattus norvegicus*) DENGAN METODE RT-qPCR

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Luka bakar merupakan kerusakan jaringan kulit yang memicu reaksi peradangan. TNF- α adalah sitokin proinflamasi utama yang memiliki peran ganda dalam penyembuhan luka, sehingga keseimbangan ekspresinya pada fase inflamasi awal sangat krusial. Inovasi sediaan *patch film* sekretom *Mesenchymal Stem Cell* (MSC) asal jaringan adiposa dikembangkan sebagai alternatif penghantaran obat yang praktis dan terkontrol. Sekretom dari sel punca mesenkimal mengandung sejumlah faktor pertumbuhan dan sitokin yang dapat memicu penyembuhan luka. Penelitian ini bertujuan untuk mengetahui efektivitas sediaan *patch* sekretom MSC dalam memengaruhi ekspresi gen TNF- α pada jaringan luka bakar tikus (*Rattus norvegicus*) menggunakan metode RT-qPCR. Tiga formula *patch* sekretom MSC yaitu (5%, 10%, 15%) dikembangkan dan dilakukan evaluasi fisik. Pengujian *in vivo* dilakukan menggunakan tikus Wistar jantan yang diinduksi luka bakar derajat II dan dibagi menjadi 5 kelompok yaitu kontrol negatif, kontrol positif (silver sulfadiazine), dan kelompok dengan 3 konsentrasi serketom bertingkat. Sampel jaringan kulit diambil untuk dianalisis ekspresi relatif gen TNF- α menggunakan metode RT-qPCR. Data hasil analisis kemudian dihitung menggunakan metode Livak dengan hasil pada kelompok negatif, positif, *patch* sekretom 5%, 10%, dan 15%, secara berturut-turut sebesar 1,08; 2,07; 1,96; 1,53; dan 1,34. Analisis statistik *one-way ANOVA* menunjukkan adanya pengaruh yang signifikan antara kelompok perlakuan ($p=0,007$). Uji lanjutan Duncan menunjukkan kelompok *patch* sekretom 5% mengalami peningkatan ekspresi gen TNF- α tertinggi 1,96 yang setara dengan kontrol positif, 2,07 berbeda nyata dengan kontrol negatif 1,08. Dapat disimpulkan sediaan *patch* sekretom *Mesenchymal Stem Cell* memiliki efektivitas terhadap ekspresi gen TNF- α dalam penyembuhan luka bakar tikus secara *in vivo*.

Kata Kunci: Luka bakar, sekretom, *mesenchymal stem cell*, *patch*, TNF- α , RT-qPCR.

ABSTRACT

EFFECTIVENESS OF A MESENCHYMAL STEM CELL SECRETOME PATCH ON TNF- α GENE EXPRESSION IN BURN WOUNDS OF RATS (*RATTUS NORVEGICUS*) USING THE RT-qPCR METHOD

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Burns represent skin tissue damage that triggers an inflammatory reaction. TNF- α is a primary proinflammatory cytokine that plays a dual role in wound healing, making the balance of its expression during the early inflammatory phase highly crucial. An innovative adipose-derived *Mesenchymal Stem Cell* (MSC) secretome *patch film* formulation was developed as a practical and controlled alternative for drug delivery. The secretome from *Mesenchymal Stem Cells* contains numerous growth factors and cytokines capable of promoting wound healing. This study aims to determine the effectiveness of the MSC secretome *patch* formulation in influencing TNF- α gene expression in the burn tissue of rats (*Rattus norvegicus*) using the RT-qPCR method. Three MSC secretome *patch* formulas (5%, 10%, and 15%) were developed and subjected to physical evaluation. In vivo testing was conducted using male Wistar rats induced with second-degree burns, which were divided into 5 groups: a negative control, a positive control (silver sulfadiazine), and three groups treated with the graduated secretome concentrations. Skin tissue samples were collected to analyze the relative expression of the TNF- α gene using the RT-qPCR method. The analysis data were then calculated using the Livak method. The results for the negative control, positive control, 5%, 10%, and 15% secretome *patch* groups were 1.08, 2.07, 1.96, 1.53, and 1.34, respectively. One-way ANOVA statistical analysis demonstrated a significant difference among the treatment groups ($p=0.007$). Duncan's post hoc test showed that the 5% secretome *patch* group experienced the highest increase in TNF- α gene expression at 1.96, which was equivalent to the positive control 2.07 and significantly different from the negative control 1.08. It can be concluded that the *Mesenchymal Stem Cell* secretome *patch* formulation is effective in TNF- α gene expression in in vivo rat burn wound healing.

Keywords: Burn wounds, *mesenchymal stem cell*, secretome, *patch*, TNF- α , RT-qPCR.