

ABSTRACT

Nesya Sulistia, 24020121130103. Comparative Analysis of hWJ-MSC-Derived Secretome and Exosome Therapy in Promoting Cell Migration in an *In-vitro* Acute Lung Injury (ALI) Wound Model. Under the supervision of Muhammad Anwar Djaelani and Raden Zainullah Ramdan.

Acute Lung Injury (ALI) is an acute inflammatory condition of the lungs characterized by alveolar epithelial damage and impaired respiration. Current therapeutic approaches are primarily supportive and have not yet been able to directly repair tissue damage. Regenerative therapy based on mesenchymal stem cells derived from Wharton's Jelly (hWJ-MSCs) has emerged as a promising approach, particularly through paracrine products such as secretome and exosomes. Direct comparative studies evaluating their efficacy in promoting cell migration in ALI wound models remain limited. Cell migration is a crucial stage in lung tissue repair, especially during the proliferative and remodeling phases, when cells move toward the wound area to facilitate granulation, angiogenesis, and extracellular matrix remodeling. This study aimed to compare the effectiveness of hWJ-MSC-derived secretome and exosomes in supporting alveolar epithelial cell migration in an *in vitro* ALI wound model. The wound model was generated using the scratch method in A549 cell monolayer cultures, followed by treatment with secretome or exosomes at concentrations of 10%, 20%, and 30%. Observations were conducted over four days, and wound closure percentage was quantified using ImageJ. Cell migration data were analyzed using one-way ANOVA followed by Tukey's post-hoc test, whereas total protein content was analyzed using Kruskal–Wallis followed by Dunn's post-hoc test. The results demonstrated that 10% secretome (P1) was the most effective in promoting cell migration ($p < 0.05$), whereas 30% secretome (P3) showed the highest increase in total protein content. These findings indicate that the effectiveness of cell migration is dependent on bioactive components, concentration, and duration of action rather than total protein content alone. SDS-PAGE revealed that secretome contained a broader molecular diversity, while exosomes carried more specific cargo. Overall, secretome played a significant role in promoting cell migration and wound closure compared with exosomes, which exerted more specific effects on intercellular communication and inflammatory regulation.

Keywords: *Acute lung injury, hWJ-MSCs, secretome, exosome, cell migration, scratch assay*