

INTISARI

Kegagalan angiogenesis pada penyembuhan luka akut dapat mengakibatkan luka kronis. Pandan wangi, bunga cengkeh, dan kitosan diketahui mampu menstimulasi tahap angiogenesis sehingga meningkatkan jumlah pembuluh darah dalam penyembuhan luka akut. Penelitian ini bertujuan untuk mengetahui potensi nanospray kombinasi ekstrak daun pandan wangi, minyak atsiri bunga cengkeh, dan kitosan terhadap jumlah pembuluh darah luka akut gingiva tikus *Sprague Dawley* dan kemungkinan terbentuknya ikatan bahan aktif terhadap reseptor proangiogenik VEGFR2.

Tikus *Sprague Dawley* sebanyak 45 ekor dibagi menjadi tiga kelompok perlakuan yaitu nanospray, Aloclair spray sebagai kontrol positif, dan akuades sebagai kontrol negatif. Jumlah pembuluh darah diamati secara histologis pada hari ke-1, 3, 5, 7, dan 9 pasca pemberian luka akut gingiva menggunakan *punch biopsy* berdiameter 2,5 mm hingga kedalaman luka mencapai tulang alveolar. Data dianalisis menggunakan *Two-Way ANOVA* signifikansi 95%. Penelitian *in silico molecular docking* mengamati energi afinitas dan jenis ikatan yang mungkin terbentuk antara bahan aktif setiap bahan uji terhadap reseptor proangiogenik VEGFR2.

Hasil penelitian *in vivo* menunjukkan adanya pengaruh hari, kelompok, dan interaksi hari dengan kelompok perlakuan terhadap jumlah pembuluh darah pada luka akut gingiva tikus *Sprague Dawley* ($p < 0,05$). Uji *post hoc* LSD menunjukkan bahwa kelompok perlakuan memiliki perbedaan signifikan terhadap kelompok kontrol negatif maupun kontrol positif ($p < 0,05$). Penelitian *in silico* menunjukkan eugenol memiliki energi ikatan terhadap VEGFR2 paling tinggi. Kesimpulan penelitian ini adalah nanospray kombinasi 12,5% ekstrak daun pandan wangi, 5% minyak atsiri bunga cengkeh, dan 1% kitosan berpengaruh terhadap jumlah pembuluh darah luka akut gingiva. Kemungkinan bahan aktif berikatan terhadap reseptor proangiogenik VEGFR2 tergolong rendah.

Kata Kunci : nanospray, pandan wangi, cengkeh, kitosan, pembuluh darah, luka akut, gingiva

ABSTRACT

Failure of angiogenesis in acute wound healing can result in chronic wounds. Pandan wangi, clove flowers, and chitosan are known to stimulate the angiogenesis stage thereby increasing the number of blood vessels in healing acute wounds. This study aims to determine the potential of a nanospray combination of pandan wangi leaf extract, clove flower essential oil, and chitosan on the number of blood vessels in acute gingival wounds of Sprague Dawley rats and the possibility of forming bonds of the active ingredients to the proangiogenic receptor VEGFR2.

45 Sprague Dawley rats were divided into three treatment groups, there are nanospray, Alocclair spray as a positive control, and aquadest as a negative control. The number of blood vessels observed histologically on days 1, 3, 5, 7, and 9 after acute wounding on gingiva using a punch biopsy with a diameter of 2.5 mm until the depth of the wound reaches the alveolar bone. The data were analyzed using Two-Way ANOVA at 95% significance. In silico molecular docking research examines the affinity energy and types of bonds that may form between the active ingredients of each test substance and the proangiogenic receptor VEGFR2.

The results of in vivo research showed that there was an effect of day, group, and the interaction of day with the treatment group on the number of blood vessels in acute gingival wounds of Sprague Dawley rats ($p < 0.05$). The LSD post hoc test showed that the treatment group had a significant difference from the negative control and also the positive control groups ($p < 0.05$). In silico research shows that eugenol has the highest binding energy to VEGFR2. This research concludes that the nanospray combination of 12.5% pandan wangi leaf extract, 5% clove flower essential oil, and 1% chitosan has an effect on the number of blood vessels in acute gingival wounds. The possibility of active ingredients to bind with proangiogenic receptor VEGFR2 is relatively low.

Keywords : nanospray, pandan wangi leaf, cloves, chitosan, proangiogenic, acute wound, gingiva