

**AKTIVITAS EKSTRAK PEGAGAN (*Centella asiatica* (L.) TERHADAP
REGENERASI SIRIP KAUDAL IKAN ZEBRA (*Danio rerio*) BERDASAR
PENGAMATAN EKSPRESI GEN *BMP-2b* (*bone morphogenetic protein 2b*)**

Muhammad Ambar Ainullah
Program Studi Farmasi

INTISARI

Penyembuhan luka merupakan proses memperbaiki jaringan yang disebabkan oleh luka akut maupun luka kronik. Salah satu tanaman yang sering digunakan adalah pegagan dengan kandungan aktif terpenoid (*asiaticoside*), senyawa ini memiliki aktivitas sebagai penyembuhan luka dan berperan menstimulus produksi ekspresi gen *BMP-2b*, model pengujian ini menggunakan sirip kaudal ikan zebra. Tujuan penelitian ini untuk mengetahui aktivitas penyembuhan luka ekstrak pegagan dengan model hewan uji ikan zebra (*Danio rerio*) berdasarkan pengamatan ekspresi gen *BMP-2b*. Pengujian dilakukan dengan pembagian hewan uji menjadi 3 kelompok (n=50 ikan untuk masing-masing kelompok) pada kelompok normal hanya diberi makan-minum *ad libitum* dan dilakukan amputasi sirip, 2 kelompok pemberian ekstrak pegagan (amputasi dengan pemejanan ekstrak dengan dosis 2,5 ppm dan 5 ppm). Sirip ikan diamati sebelum dan sesudah pemotongan pada hari pertama dan ke 5 menggunakan mikroskop stereo (*Zeiss*). Rata-rata persentase luas regenerasi permukaan sirip ikan zebra dianalisis menggunakan *software* pada mikroskop stereo dan ekspresi gen *BMP-2b* diidentifikasi menggunakan metode *real time* RT-PCR yang menghasilkan nilai akhir $2^{-\Delta\Delta C_t}$. Pada perhitungan rata-rata persentase luas regenerasi sirip kaudal ikan zebra mendapatkan hasil sebesar 26,55% (kontrol normal), 32,22% (perlakuan 2,5 ppm), dan 41,46% (perlakuan 5 ppm). Selanjutnya, luas regenerasi diukur menggunakan analisis statistik, didapatkan hasil yang berbeda signifikan pada dosis 5 ppm ($p < 0,05$). Pengujian ekspresi gen *BMP-2b* dilakukan menggunakan metode *real time* RT-PCR dan mendapatkan hasil rerata 13,57 (kontrol normal) 1,79 (dosis 2,5 ppm), dan 88,95 (dosis 5 ppm) yang tidak berbeda signifikan secara statistik. Ekstrak etanol daun pegagan meningkatkan proses pertumbuhan regenerasi sirip kaudal ikan zebra yang mengalami luka dan menstimulus pembentukan gen *BMP-2b* pada dosis 5 ppm.

Kata kunci : Ekstrak pegagan, Ikan zebra, *BMP-2b*.

THE ACTIVITY OF PEGAGAN LEAVES EXTRACT (*Centella asiatica* (L.) ON REGENERATION OF THE CAUDAL FIN OF ZEBRA FISH (*Danio rerio*) BASED ON OBSERVATIONS OF *BMP-2b* GEN EXPRESSION (*bone morphogenetic protein 2b*)

Muhammad Ambar Ainullah
Departement of Pharmacy

ABSTRACT

Wound healing is the process of repairing tissue caused by acute and chronic wounds. One of the plants that are often used is centella asiatica with the active content of terpenoids (asiaticoside), this compound has activity in wound healing and plays a role in stimulating the production of BMP-2b gene expression, this test model uses the caudal fin of zebrafish. The purpose of this study was to determine the wound healing activity of extract centella asiatica using a zebrafish (*Danio rerio*) test animal model based on the observation of BMP-2b gene expression. The test was carried out by dividing the test animals into 3 groups (n=50 fish for each group) in the normal group only being fed and drinking ad libitum and fin amputation was carried out, and 2 groups were given extract centella asiatica (amputation by exposing the extract with a dose of 2.5 ppm and 5 ppm). Fish fins were observed before and after the slaughter on the first and 5th days using a stereo microscope (Zeiss). The average percentage of surface regeneration area of zebrafish fins was analyzed using software on a stereo microscope and BMP-2b gene expression was identified using the real time RT-PCR method which resulted in a final value of $2^{-\Delta\Delta Ct}$. In the calculation of the average percentage of caudal fin regeneration of zebrafish, the results were 26.55% (normal control), 32.22% (2.5 ppm treatment), and 41.46% (5 ppm treatment). Furthermore, the regeneration area was measured using statistical analysis, and the results obtained were significantly different at a dose of 5 ppm ($p < 0.05$). The test of BMP-2b gene expression was carried out using the real time RT-PCR method and obtained a mean result of 13.57 (normal control), 1.79 (2.5 ppm dose), and 88.95 (5 ppm dose) which were not different. statistically significant. The ethanol extract of centella asiatica increased the regeneration process of the caudal fin regeneration of injured zebrafish and stimulated the formation of the BMP-2b gene at a dose of 5 ppm.

Keyword: Extract pegagan, Zebrafish, BMP-2b