

## ABSTRAK

**Latar Belakang :** *Spinal cord injury* (SCI) menyebabkan serangkaian proses patologi/cedera primer dan sekunder yang berujung pada defisit neurologis di bawah segmen lesi, terutama fungsi motorik. Meskipun memiliki angka morbiditas dan mortalitas tinggi, pilihan terapi SCI masih terbatas. Eksplorasi cedera sekunder menjadi peluang pengembangan terapi SCI karena sifatnya yang destruktif, tetapi reversibel. Salah satu proses pada cedera sekunder adalah infiltrasi leukosit dan inflamasi. Studi eksperimental menggunakan hewan model berukuran besar diperlukan agar hasilnya lebih relevan untuk aplikasi klinis. Anjing menjadi hewan model pilihan karena memiliki morfologi dan ukuran tulang belakang serta patogenesis SCI yang dapat merepresentasikan manusia.

**Tujuan:** Penelitian ini bertujuan untuk mengetahui hubungan derajat infiltrasi leukosit pada jaringan *spinal cord injury* terhadap kemampuan motorik di anjing model.

**Metode:** Studi kuasi eksperimental *in vivo* dengan subjek anjing (*Canis lupus familiaris*). Pencederaan sumsum tulang belakang dilakukan dengan metode kompresi balon pada level T10. Motorik subjek diobservasi secara berkala yang kemudian diinterpretasi dalam bentuk *cBBB score* (skor 0 – 19). Setelah subjek terminasi, jaringan *spinal cord postmortem* diambil dan dibentuk sediaan menggunakan pewarnaan *hematoxylin eosin*. Jaringan tersebut selanjutnya diamati melalui mikroskop untuk dinilai *grading* infiltrasi leukositnya (derajat 0 – 4), terutama pada *hotspot lesion* (T10). Korelasi derajat infiltrasi leukosit dan *cBBB score* dianalisis menggunakan *Spearman test*.

**Hasil:** Derajat infiltrasi leukosit cenderung lebih tinggi pada fase akut/subakut daripada fase kronis. Sebaliknya, *cBBB score* cenderung lebih tinggi pada fase kronis dibandingkan fase akut/subakut. Beberapa variasi hasil yang berbeda dengan pola tersebut terjadi akibat adanya infeksi dan pemberian intervensi berupa implantasi *scaffold* dan *stem cell*. Derajat infiltrasi leukosit dinilai berhubungan secara signifikan terhadap kemampuan motorik dengan kekuatan hubungan bersifat sedang dan tidak searah [koefisien -0.614;  $p < 0.5$ ].

**Kesimpulan:** Baik pada fase akut/subakut maupun kronis, semakin tinggi derajat infiltrasi leukosit pada jaringan *spinal cord injury*, maka semakin rendah kemampuan motorik (dinilai dengan *cBBB score*).

**Kata kunci:** *spinal cord injury*, infiltrasi leukosit, kemampuan motorik, *cBBB score*, anjing

## ABSTRACT

**Background:** Spinal cord injury (SCI) causes a series of primary and secondary pathologic processes/injuries that lead to neurological deficits below the lesion segments, especially motor function. Despite its high morbidity and mortality rates, SCI treatment options are still limited. Exploration of secondary injury becomes an opportunity for the development of SCI treatment due to its destructive, but reversible nature. One of the processes in secondary injury is leukocyte infiltration and inflammation. Experimental studies using large animal models are needed to make the results more relevant for clinical applications. Dog/canine is the animal model of choice because they have spinal morphology, spinal size, and SCI pathogenesis that can represent humans.

**Objective:** This study aims to determine the relationship between the degree of leukocyte infiltration on spinal cord injury tissue and motor function in canine as animal model.

**Method:** In vivo quasi-experimental study with canine (*Canis lupus familiaris*) as subject. Spinal cord injury is performed using balloon compression method at T10 level. Subjects' motor function are observed periodically which then interpreted in the form of cBBB score (score 0 - 19). After subject termination, postmortem spinal cord tissue is taken and prepared using hematoxylin eosin staining. The tissue is then observed through a microscope to assess the grading of leukocyte infiltration (degree 0 - 4), especially in hotspot lesion (T10). Correlation between the degree of leukocyte infiltration and cBBB score is analyzed using Spearman test.

**Result:** The degree of leukocyte infiltration tends to be higher in the acute/subacute phase than in the chronic phase. Conversely, cBBB score tends to be higher in the chronic phase than in the acute/subacute phase. Some variations in results that differ from this pattern occur due to infection and intervention (implantation of scaffolds and stem cells). The degree of leukocyte infiltration evidenced to be significantly related to motor function with moderate strength and non-unidirectional relationship [coefficient -0.614;  $p < 0.5$ ].

**Conclusion:** In both acute/subacute and chronic phases, the higher the degree of leukocyte infiltration on spinal cord injury tissue, the lower the motor function (assessed by cBBB score).

**Keywords:** spinal cord injury, leukocyte infiltration, motor function, cBBB score, canine