

Analysis of Liver Fibrosis in CCl₄-Induced Rat Liver by Administering Different Doses of Umbilical Cord-Derived Mesenchymal Stem Cell = Analisis Fibrosis Hati Tikus Perlakuan CCl₄ dengan Pemberian Dosis Sel Punca Tali Pusat yang Berbeda

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Abstrak

Pendahuluan Fibrosis hati adalah kondisi ketika hati mengalami cedera kronis dan terbentuk jaringan parut termasuk kolagen sehingga tidak lagi mampu berfungsi dengan baik. Terapi sel punca mesenkimal asal tali pusat merupakan terapi regeneratif yang dikembangkan untuk penyembuhan penyakit jejas hati kronis. Hasil penelitian terdahulu terhadap tikus yang diinduksi dengan 2AAF/CCl₄ dan diberi sel punca mesenkimal asal tali pusat dosis 1 x 10⁶ menunjukkan adanya perbaikan fibrosis hati yang ditimbulkan akibat pemberian 2AAF/CCl₄ tersebut. Penelitian ini akan menggunakan CCl₄, suatu zat yang akan merusak hati tikus secara akut dan akan membandingkan dua dosis sel punca mesenkimal asal tali pusat yaitu dosis 1 x 10⁶ dan 3 x 10⁶. Metode Penelitian ini menggunakan bahan biologis tersimpan blok parafin dari jaringan hati tikus Wistar yang dipulas dengan pulasan khusus Masson's Trichrome. Terdapat empat kelompok sampel yang digunakan, yaitu kelompok CCl₄, kelompok 1 x 10⁶ sel punca, kelompok 3 x 10⁶ sel punca, dan kelompok kontrol sehat. Seluruh pulasan dari tiap kelompok difoto menggunakan kamera yang terhubung ke mikroskop. Derajat fibrosis pada setiap lapangan pandang dihitung menggunakan kriteria NASH beserta luas hati yang terkena fibrosis. Data yang diperoleh dianalisis secara statistik untuk mengetahui dosis mana yang lebih baik untuk memperbaiki fibrosis hati.

Hasil Kelompok tikus dengan induksi CCl₄ saja menunjukkan 100% sampel mengalami fibrosis, sedangkan kelompok sehat memperlihatkan hanya sekitar 30% sampel yang mengalami fibrosis. Kelompok tikus dengan induksi CCl₄ dan diberikan 1 x 10⁶ sel punca menunjukkan 71% sampel masih mengalami fibrosis, sedangkan pada kelompok dengan pemberian 3 x 10⁶ sel punca jumlah sel yang mengalami fibrosis adalah 87%. Tidak terdapat perbedaan bermakna antara derajat fibrosis di semua kelompok uji. Di sisi lain, pemberian 1 x 10⁶ sel punca berhasil menurunkan luas hati yang terkena fibrosis.

.....Background Liver fibrosis is the excessive accumulation of extracellular matrix proteins including collagen that occurs in most types of chronic liver diseases. Previous studies have shown that the injection of mesenchymal stem cell is beneficial to alleviate liver fibrosis. However, the optimum dose of stem cell that must be administered is not yet fully understood. Previous research used 1 x 10⁶ stem cells to treat 2AAF/CCl₄ – induced rat liver which simulates a chronic liver injury. Results show that the degree of fibrosis was significantly reduced. In this study, only CCl₄ will be used to simulate an acute liver injury and two doses of human umbilical cord-derived mesenchymal stem cell (hUC-MSC), 1 x 10⁶ and 3 x 10⁶, is used to analyze which dose is better to treat liver fibrosis. Methods This study uses archived biological materials on Wistar rat livers as formalin-fixed-paraffin-embedded (FFPE) which has been treated with Masson's Trichrome staining. Four group samples were used in this study, which are the CCl₄ group, 1 x 10⁶ hUC-MSC group, 3 x 10⁶ hUC-MSC group, and healthy control group. Slide samples were photographed using a microscope and the results collected. The degree of fibrosis is then investigated using the NASH criteria and the mean percentage affected area is calculated. Further statistical analysis is

conducted to know which treatment is better at reducing liver fibrosis. Results The group with the highest degree of fibrosis is the CCl₄ group with 100% of the samples experiencing fibrosis. On the other side, the healthy control group has the lowest degree of fibrosis where around 70% of the samples showing no fibrosis. Both the 1 x 10⁶ and 3 x 10⁶ hUC-MSC group show some samples having no fibrosis while the majority still had fibrosis of different degrees. Approximately 29% of the samples of the 1 x 10⁶ hUC-MSC group did not show fibrosis while only 13% of the samples showed no fibrosis in the 3 x 10⁶ hUC-MSC group. However, there were no statistical difference in the degree of fibrosis found in all the samples. On the contrary, analysis of the fibrosis affected area showed that the 1 x 10⁶ group is beneficial to reduce the affected area of liver fibrosis. Conclusion The administration of 3 x 10⁶ stem cells does not create a better outcome in terms of liver fibrosis. In contrast, the group which was treated with only 1 x 10⁶ stem cells showed that there is a decrease in the affected area of fibrosis even if the degree of fibrosis was not significantly decreased.