INTISARI

Latar Belakang : Gagal ginjal kronis (GGK) menyebabkan inflamasi pada endotel ginjal dengan meningkatnya ekspresi *vascular cell adhesion molecule-1* (VCAM-1). Eksosom dari *Human Umbilical Cord Mesenchymal Stem Cells* (HUC-MSC) diketahui memiliki potensi besar dalam pengobatan gagal ginjal tetapi efeknya terhadap inflamasi endotel pada model GGK belum diketahui.
Tujuan : Untuk mengkaji pengaruh eksosom dari HUC-MSC terhadap inflamasi endotel pada tikus model 5/6 *subtotal nephrectomy*.
Metode : Penelitian ini menggunakan metode quasi-eksperimental dengan rancangan penelitian *post-test only with controlled group design* dengan sampel tikus jantan Wistar (n=35, 2-3 bulan, 150-250 gram). Model 5/6 *subtotal nephrectomy* (5/6-SN) dilakukan untuk menginduksi GGK. Tikus dibagi menjadi lima kelompok yaitu kontrol/Sham Operation (SO), 5/6-SN (SN), serta 5/6-SN dengan injeksi eksosom HUC-MSC dosis 48,30 µg (SNE1), 96,60 µg (SNE2), dan 193,20 µg (SNE3). Eksosom HUC-MSC diberikan sebanyak dua kali per minggu selama empat minggu (minggu kedua sampai kelima) melalui vena ekor tikus. Tikus diterminasi pada minggu keenam untuk memeriksa cedera organ pasca 5/6 *subtotal nephrectomy*. Jaringan ginjal diwarnai dengan *Periodic acid–Schiff* (PAS) untuk melihat tampilan sebaran sel radang perivaskuler. *Reverse Transcriptase-Polymerase Chain Reaction* (RT-PCR) digunakan untuk memeriksa ekspresi mRNA VCAM-1.
Hasil : Hasil menunjukkan skor sebaran sel radang perivaskuler yang sama pada kelompok SNE1 dibandingkan kelompok SO. Ekspresi mRNA VCAM-1 juga lebih rendah signifikan pada SNE1, SNE2, dan SNE3 dibanding SN ($p<0,01$), dengan nilai terendah pada SNE2 walaupun tidak bermakna dibanding SNE1 dan SNE3.
Kesimpulan : Eksosom dari HUC-MSC memiliki efek dalam menurunkan skor sebaran sel radang perivaskuler ginjal dan ekspresi marker inflamasi endotel VCAM-1.

Kata Kunci : Gagal ginjal kronis (GGK), inflamasi endotel ginjal, *subtotal nephrectomy, vascular cell adhesion molecule-1* (VCAM-1), eksosom, *Human Umbilical Cord Mesenchymal Stem Cells* (HUC-MSC).

ABSTRACT

Background : Chronic kidney disease (CKD) causes inflammation of renal endothelium with increased expression of vascular cell adhesion molecule-1 (VCAM-1). Exosomes derived from Human Umbilical Cord Mesenchymal Stem Cells (HUC-MSCs) are known to have great potential in the treatment of kidney disease; however, their effects on endothelial inflammation in CKD models remain unclear.

Objective : To investigate the effects of HUC-MSC-derived exosomes on endothelial inflammation in a 5/6 subtotal nephrectomy rat model.

Methods : This study employed a quasi-experimental, post-test only with controlled group design using male Wistar rats (n=35, 2–3 months old, 150–250 g). A 5/6 subtotal nephrectomy (5/6-SN) was performed to induce CKD. Rats were divided into five groups: Sham Operation (SO), 5/6-SN (SN), and 5/6-SN with HUC-MSC exosome injections at doses of 48.30 µg (SNE1), 96.60 µg (SNE2), and 193.20 µg (SNE3). Exosomes were administered twice weekly for four weeks (weeks 2–5) via tail vein injection. Rats were terminated in week 6 to assess renal injury after 5/6-SN. Kidney tissues were stained with Periodic acid–Schiff (PAS) to observe perivascular inflammatory cell distribution. Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) was used to assess mRNA expression of VCAM-1.

Results : The results showed a similar perivascular inflammatory cell distribution score in the SNE1 group compared to the SO group. VCAM-1 mRNA expression was also significantly lower in SNE1, SNE2, and SNE3 compared to SN ($p<0.01$), with the lowest expression in SNE2, although not significantly different from SNE1 and SNE3.

Conclusion : HUC-MSC-derived exosomes exert a protective effect by reducing renal perivascular inflammatory cell infiltration and endothelial inflammatory marker VCAM-1 expression.

Keywords : Chronic kidney disease (CKD), renal endothelial inflammation, subtotal nephrectomy, vascular cell adhesion molecule-1 (VCAM-1), exosomes, Human Umbilical Cord Mesenchymal Stem Cells (HUC-MSC).