

EFFECT OF CALCITRIOL TREATMENT IN SERUM CREATININE LEVEL AND SOD-1 MRNA EXPRESSION IN MICE WITH KIDNEY ISCHEMIC / REPERFUSION INJURY

ABSTRACT

Background. Chronic Kidney Disease (CKD) is currently one of rising health problem around the world. CKD can be induced by Acute Kidney Injury (AKI), which mainly caused by kidney ischemic reperfusion injury (IRI). Kidney IRI will form Reactive Oxygen Species (ROS), leading to oxidative stress with reduced antioxidant enzyme, especially Superoxide Dismutase 1 (SOD-1). Vit D not only has function for calcium regulation, but also has renoprotective effect. The effect of Vit D during kidney IRI still need to be elucidated

Objective. This study elucidated the effect of Vitamin D treatment to kidney ischemic reperfusion injury.

Method. Kidney IRI model was performed using bilateral renal pedicles clamping in swiss mice for 30 minutes then reperfused. Subjects were divided into five groups that contain 5 mice each: Shame Operation Group (SO), IRI 3 (terminated at day 3 after kidney IRI), IRI 12 (terminated at day 12 after kidney IRI), IRI 3 Vit D (IRI 3 with daily calcitriol i.p. 0.5 µg/kgBW) and IRI 12 Vit D (IRI 12 with daily calcitriol i.p. 0.5 µg/kgBW). Serum Creatinine level were measured from each group and Reverse Transcription – PCR was used to measure SOD-1 mRNA expression.

Result Kidney IRI caused acute damage on kidney as shown in higher serum creatinine level in IRI 3 and IRI 12 compared to SO group. After calcitriol treatment, both IRI 3 Vit D and IRI 12 Vit D had lower serum creatinine level compared with IRI 3 and IRI 12 group respectively. Longer duration of calcitriol treatment also further lowered the serum creatinine level as serum creatinine level in IRI 12 Vit D was lower compared with IRI 3 Vit D. Kidney IRI also cause the expression of SOD-1 in both IRI 3 and IRI 12 group was lower compared with SO group. After calcitriol treatment, mRNA expression of SOD-1 in IRI 3 Vit D and IRI 12 Vit D was higher compared with IRI 3 and IRI 12 group respectively. There was no difference of mRNA expression of SOD-1 between 3 days and 12 days duration of calcitriol treatment

Conclusion. In this study, calcitriol treatment reduced serum creatinine level and increased mRNA expression of SOD-1

Keywords: Calcitriol, Kidney ischemic reperfusion injury, Serum Creatinine, Superoxide Dismutase-1

EFEK PENGOBATAN CALCITRIOL TERHADAP LEVEL SERUM KREATININE DAN EKSPRESI MRNA SOD-1 UNTUK MENCIT DENGAN CIDERA ISKEMIK/REPERFUSI GINJAL

INTISARI

Latar Belakang. Gagal Ginjal Kronis (GGK) merupakan masalah kesehatan yang menaik tinggi di dunia. GGK dapat diinduksi oleh Gagal Ginjal Akut (GGA), yang sering disebabkan oleh cedera iskemik/reperfusi ginjal. Cedera iskemik/reperfusi ginjal akan membentuk *ROS*, menaikkan *oxidative stress*, dan menurunkan produksi enzim antioksidan, terutama Superoxide Dismutase 1 (SOD-1). Vit D umumnya diketahui sebagai vitamin yang meregulasi mineral kalsium dan fosfor, tapi juga memiliki fungsi *renoprotective effect*/perlindungan terhadap ginjal. Efek Vit D saat cedera iskemia reperfusi ginjal masih perlu diteliti

Tujuan. Penelitian ini untuk mengetahui fungsi terapi vitamin D terhadap mengurangi efek cedera iskemia reperfusi ginjal di mencit *swiss mice*

Metode. Model cedera iskemia reperfusi ginjal dibuat dengan meng-klem pediculus bilater kedua ginjal di mencit selama 30 menit lalu dilepas. Subjek dibagi menjadi 5 kelompok dengan 5 mencit di masing-masing kelompok. Kelompok terdiri dari: SO (*Shame Operation*), IRI 3 (Terminasi di hari ke 3 setelah cedera iskemia reperfusi), IRI 12 (Terminasi di hari ke 12 setelah cedera iskemia reperfusi), IRI 3 Vit D (IRI 3 dengan terapi kalsitriol rute i.p. dosis 0.5 µg/kgBB) dan IRI 12 Vit D (IRI 12 dengan terapi kalsitriol rute i.p. dosis 0.5 µg/kgBB). Serum kreatinin level dihitung tiap group dan ekspresi mRNA SOD-1 dicek dengan RT-PCR gen SOD-1

Hasil. Cedera Iskemia Reperfusi ginjal dapat menyebabkan cedera akut ditandai dengan kenaikan kadar serum kreatinin di IRI 3 and IRI 12 dibanding SO. Setelah terapi kalsitriol, kadar serum kreatinin di kelompok IRI 3 Vit D dan IRI 12 Vit D lebih rendah daripada kelompok tanpa terapi kalsitriol (IRI 3 dan IRI 12). Terapi dengan durasi lebih lama di kelompok IRI 12 Vit D juga menurunkan kadar serum kreatinin dibandingkan di kelompok IRI 3 Vit D. Ekspresi mRNA SOD-1 setelah cedera iskemia reperfusi ginjal di kelompok IRI 3 dan IRI 12 lebih rendah dibanding SO. Setelah terapi kalsitriol, ekspresi mRNA SOD-1 di kelompok IRI 3 Vit D dan IRI 12 Vit D lebih tinggi dibandingkan dengan kelompok tanpa terapi calcitriol (IRI 3 dan IRI 12 masing-masing). Tidak ada perbedaan ekspresi mRNA SOD-1 antara durasi terapi kalsitriol 3 hari dan 12 hari.

Kesimpulan. Di penelitian ini, terapi kalsitriol dapat mengurangi kadar serum kreatinin dan meningkatkan ekspresi mRNA SOD-1

Kata kunci : Kalsitriol, Cedera Iskemia Reperfusi Ginjal, Serum Kreatinin, *Superoxide Dismutase-1*