

## INTISARI

**Latar Belakang:** Penyakit ginjal kronis (CKD) dikarakteristikkan dengan adanya inflamasi persisten sehingga dapat menyebabkan fibrosis. Pada kondisi yang ideal, diperlukan keseimbangan antara faktor proinflamasi dan antiinflamasi. Asam klorogenat diketahui memiliki aktivitas antiinflamasi.

**Tujuan:** Mengetahui efek asam klorogenat terhadap ekspresi NF $\kappa$ B, Nrf2, CD68, dan Arg1 pada mencit yang diinduksi model subtotal nefrektomi.

**Metode:** Dua puluh lima mencit Swiss-Webster jantan (3-4 bulan) dibagi menjadi lima kelompok; SO (*sham operation*, n=5), SN selama empat belas hari (SN14, n=5), SN selama dua puluh delapan hari (SN28, n=5), SN28 dengan injeksi CGA pada hari ke 15-28 (C14, n= 5) dan SN28 dengan injeksi CGA pada hari ke 1-28 (C28, n=5). CGA disuntikkan pada 14 mg/kgBB. Mencit dikorbankan pada 14 hari (SN14) dan 28 hari (SN28, C14 dan C28) kemudian mencit di-eutanasia dan diambil ginjalnya. Ekspresi mRNA dari NF $\kappa$ B diidentifikasi dengan qRT-PCR. RT-PCR digunakan untuk menentukan ekspresi mRNA dari Nrf2, CD68, dan Arg1, adapun lokalisasi CD68 dan Arg1 diidentifikasi dengan imunohistokimia.

**Hasil:** Pemberian asam klorogenat 14 mg/kgBB menyebabkan ekspresi mRNA NF $\kappa$ B C28 dan C14 lebih rendah secara signifikan dibandingkan SN28. Ekspresi mRNA Nrf2 C28 dan C14 lebih tinggi secara signifikan dibandingkan SN28. Ekspresi CD68 pada C28 lebih rendah secara signifikan dibanding SN28, ekspresi C14 menunjukkan tidak terdapat perbedaan yang signifikan dibandingkan SN28. Ekspresi Arg1 pada C28 dan C14 menunjukkan tidak terdapat perbedaan yang signifikan dibanding SN28.

**Kesimpulan:** Pemberian asam klorogenat lebih awal menekan inflamasi dengan mekanisme *down*-regulasi ekspresi faktor pro-inflamasi N $\kappa$ KB dan ekspresi CD68 serta *up*-regulasi ekspresi Nrf2.

**Kata Kunci:** *Chlorogenic acid* (CGA), Subtotal nefrektomi, NF $\kappa$ B, Nrf2, CD68, dan Arg1

## ABSTRACT

**Background:** Chronic kidney disease (CKD) is characterized by persistent inflammation that can lead to fibrosis. Under ideal conditions, a balance between pro-inflammatory and anti-inflammatory factors is needed. Chlorogenic acid is known to have anti-inflammatory activity.

**Objective:** To determine the effect of chlorogenic acid on the expression of NF $\kappa$ B, Nrf2, CD68, and Arg1 in mice induced by a subtotal nephrectomy model.

**Methods:** Twenty-five mice male Swiss-Webster (3-4 months) were divided into five groups; SO (sham operation, n=5), SN for fourteen days (SN14, n=5), SN for twenty-eight days (SN28, n=5), SN28 with CGA injected on day 15-28 (C14, n=5) and SN28 with CGA injected on day 1-28 (C28, n=5). CGA was injected at 14 mg/kgBW. Mice were sacrificed for 14 days (SN14) and 28 days (SN28, C14 and C28) then mice were euthanized and the kidneys were harvested. mRNA expression of NF $\kappa$ B was identified by qRT-PCR. RT-PCR determined mRNA expression of Nrf2, CD68, and Arg1. Immunohistochemical determined localization of CD68 and Arg1

**Results:** The administration of chlorogenic acid 14 mg/kgBW caused the mRNA expression of NF $\kappa$ B C28 and C14 to be significantly lower than that of SN28. The mRNA expression of Nrf2 C28 and C14 was significantly higher than that of SN28. CD68 expression on C28 was significantly lower than SN28, C14 expression tended to be lower than SN28. Arg1 expression at C28 and C14 showed no significant difference compared to SN28.

**Conclusion:** Early administration of chlorogenic acid suppresses inflammation by downregulating the expression of pro-inflammatory factor NF $\kappa$ B and CD68 expression and upregulating Nrf2 expression.

**Keywords:** Chlorogenic acid (CGA), subtotal nephrectomy, NF $\kappa$ B, Nrf2, CD68 and Arg1.