

## INTISARI

### PENGARUH PAPARAN ASAP ROKOK JANGKA PANJANG TERHADAP EKSPRESI SOD-1 PADA OTOT *GASTROCNEMIUS* TIKUS PUTIH JANTAN JENIS *Rattus norvegicus*

**Latar Belakang :** Kebiasaan merokok semakin umum dijumpai di kalangan masyarakat dan merupakan ancaman buruk bagi kesehatan. Radikal bebas yang terkandung dalam rokok dapat menyebabkan terjadinya stress oksidatif yang mengarah pada kerusakan berbagai organ salah satunya otot. Stress oksidatif dapat dievaluasi menggunakan *superoxide dismutase-1* (SOD-1).

**Tujuan :** Mengkaji ekspresi mRNA SOD-1 pada otot *gastrocnemius* tikus putih jantan jenis *Rattus norvegicus* yang diberi paparan asap rokok jangka panjang durasi 20, 40, 60 hari dan pengaruh peningkatan durasi paparan asap rokok jangka panjang terhadap ekspresi mRNA SOD-1 otot *gastrocnemius*.

**Metodologi :** Penelitian ini menggunakan metode *quasi experimental post-test only group design*. Subjek penelitian ini adalah irisan beku otot *gastrocnemius* tikus putih jenis *Rattus norvegicus* yang disimpan dalam suhu  $-80^{\circ}\text{C}$  dengan kriteria tikus sehat, jantan, usia 3-4 bulan, dan berat badan 180-220 gram. Subjek dibagi menjadi 6 kelompok, yaitu tiga kelompok kontrol (PH20, PH40, PH60) dan tiga kelompok perlakuan (PH20, PH40, PH60) dengan durasi 20, 40, dan 60 hari. Kelompok perlakuan diberikan 10 batang rokok/kelompok/hari selama 50 menit dalam *smoking pump chamber*. Setelah perlakuan, hewan diambil ototnya dan disimpan dalam suhu  $-80^{\circ}\text{C}$  dilanjutkan pengukuran ekspresi mRNA SOD-1 dengan metode PCR. Hasil penelitian diuji normalitasnya dengan uji *Saphiro-Wilk*, dilanjutkan dengan uji *Kruskal-Wallis* dan uji *Mann-Whitney* untuk perbandingan antar kelompok.

**Hasil :** Rerata ekspresi mRNA SOD-1 kelompok KH20 ( $1,58 \pm 0,09$ ), KH40 ( $1,44 \pm 0,24$ ), KH60 ( $1,72 \pm 0,07$ ), PH20 ( $0,96 \pm 0,01$ ), PH40 ( $0,96 \pm 0,02$ ), PH60 ( $0,93 \pm 0,03$ ). Paparan asap rokok jangka panjang durasi 20, 40, dan 60 hari menyebabkan ekspresi mRNA SOD-1 otot *gastrocnemius* tikus putih jantan jenis *Rattus norvegicus* secara signifikan lebih rendah ( $p < 0,05$ ) dibandingkan kontrol, namun peningkatan durasi paparan asap rokok tidak memberikan perbedaan yang signifikan secara statistik ( $p > 0,05$ ) terhadap ekspresi mRNA SOD-1.

**Kesimpulan :** Ekspresi mRNA SOD-1 pada otot *gastrocnemius* tikus putih jantan jenis *Rattus norvegicus* yang diberi paparan asap rokok jangka panjang durasi 20, 40, dan 60 hari lebih rendah dibandingkan dengan kontrol dan peningkatan durasi paparan asap rokok tidak diikuti penurunan ekspresi mRNA SOD-1 pada otot *gastrocnemius* tikus putih jantan jenis *Rattus norvegicus*.

**Kata kunci :** rokok, otot, tikus, stress oksidatif, SOD-1

## ABSTRACT

### THE EFFECT OF LONG-TERM CIGARETTE SMOKE EXPOSURE ON SOD-1 EXPRESSION IN GASTROCNEMIUS MUSCLE OF MALE WHITE RAT *Rattus norvegicus*

**Background** : Smoking is increasingly common in society and becoming a public health problem. Free radicals contained in cigarettes can cause oxidative stress which leads to muscle damage. Oxidative stress can be evaluated by superoxide dismutase-1 (SOD-1).

**Objective** : To investigate the expression of mRNA SOD-1 in gastrocnemius muscle of male white rats *Rattus norvegicus* that given long-term exposure to cigarette smoke of 20, 40, 60 days and the effect of increasing the duration of long-term cigarette smoke exposure on the expression of mRNA SOD-1 gastrocnemius muscles.

**Methodology**: This study was an experimental posttest only group design method. The subjects of this study were frozen gastrocnemius muscle slices of *Rattus norvegicus* that were stored in  $-80^{\circ}\text{C}$  with the criteria of healthy males, 3-4 months in age, and 180-220 grams in weight rats. The subjects were divided into 6 groups, three control groups (PH20, PH40, PH60) and three smoking groups (PH20, PH40, PH60) with durations of 20, 40, and 60 days. The smoking group was given 10 cigarettes/group/day for 50 minutes in a smoking pump chamber. After treatment, the animals were sacrificed, the muscle were removed, and stored in a temperature of  $-80^{\circ}\text{C}$  for measurement of mRNA SOD-1 by PCR. The data were tested for normality with the Saphiro-Wilk test, followed by the Kruskal-Wallis test and the Mann-Whitney test.

**Results**: Mean mRNA expression SOD-1 were group KH20 ( $1.58 \pm 0.09$ ), KH40 ( $1.44 \pm 0.24$ ), KH60 ( $1.72 \pm 0.07$ ), PH20 ( $0.96 \pm 0.01$ ), PH40 ( $0.96 \pm 0.02$ ), PH60 ( $0.93 \pm 0.03$ ). Long-term exposure to cigarette smoke caused mRNA SOD-1 in gastrocnemius muscle of *Rattus norvegicus* significant lower ( $p < 0.05$ ) compared to controls, but increased duration of cigarette smoke exposure did not provide a statistically significant difference ( $p > 0.05$ ) towards mRNA SOD-1.

**Conclusion**: mRNA SOD-1 in gastrocnemius muscle of *Rattus norvegicus* that were given long-term exposure to cigarette smoke of 20, 40, and 60 day was lower compared to controls and the increase in duration of cigarette smoke exposure was not followed by decrease of mRNA SOD-1 expression in the gastrocnemius muscle of the *Rattus norvegicus*.

**Keywords**: smoking, muscle, rat, oxidative stress, SOD-1