

## INTISARI

### PENGARUH JENIS KELAMIN PADA EKSPRESI mRNA SUPEROXIDE DISMUTASE (SOD) 1 DAN 2 PADA GINJAL TIKUS [*Rattus norvegicus* (Berkenhout, 1769)] DIABETES MELITUS TAHAP AWAL

#### Latar belakang:

Diabetes melitus (DM) menginduksi terjadinya nefropati diabetik dengan melibatkan stres oksidatif dan cedera vaskular. Stres oksidatif akibat hiperglikemia memiliki peranan sentral dalam patogenesis nefropati diabetik. Nefropati diabetik pada tahap awal DM ditandai dengan adanya hiperfiltrasi dan mikroalbuminuria. Enzim antioksidan intraselular seperti *superoxide dismutase* (SOD) 1 dan SOD2 memiliki peranan penting dalam pertahanan sel ginjal terhadap stres oksidatif. Penelitian yang mengamati pengaruh jenis kelamin terhadap ekspresi mRNA SOD1 dan SOD2 pada ginjal tikus DM tahap awal belum ada.

#### Tujuan:

Mengkaji perbedaan ekspresi mRNA antioksidan SOD1 dan SOD2 pada ginjal tikus DM tahap awal jantan dan betina.

#### Metode:

Tikus galur *Sprague Dawley* (400-500 gram) sebanyak dua belas ekor betina dan dua belas ekor jantan dibagi menjadi empat kelompok, dua kontrol betina (KB), kontrol jantan (KJ) dan dua DM betina (DMB), DM jantan (DMJ), masing-masing kelompok terdiri atas enam ekor tikus. Pembuatan model DM dilakukan dengan cara menginjeksikan *streptozotocin* (STZ) intraperitoneal (60 mg/kgBB, dosis tunggal) dan pengukuran glukosa dilakukan 1 hari setelah injeksi, 1 dan 2 minggu setelahnya, serta hari terminasi (1 bulan setelahnya). Kemudian, perbedaan ekspresi mRNA SOD1 dan SOD2 pada ginjal akan diperiksa dengan menggunakan *Reverse Transcriptase* PCR (RT-PCR) dan dikuantifikasi untuk melihat ada atau tidaknya perbedaan antara tikus betina dan jantan.

#### Hasil:

Kelompok DMB memiliki ekspresi mRNA SOD1 lebih tinggi signifikan dibanding DMJ ( $p=0,006$ ;  $p<0,05$ ), tetapi tidak ditemukan perbedaan signifikan pada ekspresi mRNA SOD2 pada kelompok DMB dan DMJ ( $p=0,105$ ;  $p>0,05$ ). Sedangkan pada kelompok kontrol (KB dan KJ), ekspresi mRNA SOD1 dan SOD2 juga tidak berbeda secara signifikan (SOD1:  $p=0,864$ ; SOD2:  $p=0,060$ ;  $p>0,05$ ).

#### Kesimpulan:

Jenis kelamin berpengaruh terhadap ekspresi mRNA SOD1, tetapi tidak pada ekspresi mRNA SOD2 ginjal tikus DM tahap awal.

#### Kata Kunci:

Diabetes melitus, SOD1, SOD2, nefropati diabetik, tikus

## ABSTRACT

### EFFECT OF GENDER DIFFERENCES ON mRNA EXPRESSION OF SUPEROXIDE DISMUTASE (SOD) 1 AND 2 IN THE RAT KIDNEY [*Rattus norvegicus* (Berkenhout, 1769)] IN THE EARLY STAGE OF DIABETES MELLITUS

#### Background:

Diabetes mellitus (DM) induces diabetic nephropathy through oxidative stress and vascular injury. Hyperglycemia-induced oxidative stress plays a central role in pathogenesis of diabetic nephropathy. In the early stage of DM, diabetic nephropathy is characterized by hyperfiltration and microalbuminuria. Intracellular kidney antioxidant enzymes such as superoxide dismutase (SOD) 1 and SOD2 have important protective role against oxidative stress. Research focusing on how sex differences affect mRNA SOD1 and SOD2 expression on rat kidney in early DM is not yet available.

#### Aim:

This study is aimed to explore the differences of antioxidant mRNA SOD1 and SOD2 expression in the male and female rat kidney of the early stage DM.

#### Method:

Twelve female and twelve male Sprague Dawley rats (400-500 gram) were divided into four groups of two control female (KB), control male (KJ) and two DM female (DMB), DM male (DMJ), each group consists of six rats. DM model was made by injecting streptozotocin (STZ) intraperitoneal (60 mg/kgBW, single dose) and glucose measurement were done at 1 day after injection, 2 weeks after, and termination day (1 month after). Then, the kidney mRNA SOD1 and SOD2 expression were examined using Reverse Transcriptase PCR (RT-PCR) and quantified to observe possible differences between female and male rats.

#### Result:

DMB group had significantly higher mRNA SOD1 expression compared to DMJ group ( $p=0,006$ ;  $p<0,05$ ), but there was no significant difference of mRNA SOD2 expression between DMB and DMJ group ( $p=0,105$ ;  $p>0,05$ ). Whilst in control group (KB and KJ), there was also no significant difference of mRNA SOD1 and SOD2 expression (SOD1:  $p=0,864$ ; SOD2:  $p=0,060$ ;  $p>0,05$ ).

#### Conclusion:

Sex has an influence on mRNA SOD1 expression, but it was not the case for mRNA SOD2 expression in the rat kidney in the early stage of DM.

#### Keywords:

Diabetes Mellitus, SOD1, SOD2, diabetic nephropathy, rat(s).