# DISERTASI

**PENGARUH PEMBERIAN *MESENCHYMAL STEM CELL WHARTON'S JELLY* TERHADAP KADAR *MATRIX METALLOPROTEINASE-1, A DISINTEGRIN-LIKE AND METALLOPROTEINASE WITH THROMBOSPONDIN MOTIF-4, INDUCIBLE NITRIC OXIDE SYNTHASE* DAN *INTERLEUKIN-4* PADA OSTEOARTRITIS**

Penelitian Eksperimental pada *Rattus novergicus*


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# ABSTRAK

Pengaruh Pemberian *Mesenchymal Stem Cell Wharton's Jelly* Terhadap Kadar *Matrix Metalloproteinase-1, A Disintegrin-Like And Metalloproteinase With Thrombospondin Motif-4, Inducible Nitric Oxide Synthase* Dan *Interleukin-4* Pada Osteoartritis

Penelitian Eksperimental Pada *Rattus Novergicus*

Endrinaldi

Osteoarthritis (OA) secara umum dianggap sebagai penyakit sendi degeneratif yang disebabkan oleh perubahan biomekanik dan proses penuaan. Penelitian telah mengungkapkan peran proses inflamasi dalam patogenesis OA. Penelitian ini bertujuan untuk mempelajari pengaruh *Mesenchymal Stem Cell Wharton's Jelly* terhadap *bioactive marker* osteoartritis.

Penelitian ini merupakan penelitian eksperimental dengan desain *Posttest-Only Control Group Design*. Sampel terdiri dari 18 ekor tikus OA sebagai kelompok kontrol dan 18 ekor tikus OA yang diterapi dengan MSC-WJ sebagai kelompok perlakuan. Induksi OA dilakukan dengan injeksi *monosodium iodoacetate* (MIA) ke intra-artikular lutut kanan. Pemberian MSC-WJ dilakukan pada minggu ke tiga setelah induksi MIA. Kadar MMP-1, ADAMTS-4, iNOS dan IL-4 serum tikus diukur dengan metoda ELISA. Uji statistik yang digunakan adalah uji t independen. Nilai $p < 0,05$ dikatakan bermakna secara statistik.

Dari hasil penelitian didapatkan bahwa kadar MMP-1 serum lebih tinggi pada kelompok yang diterapi MSC-WJ dibandingkan kelompok kontrol ($3.96 \pm 0.81$ ng/ml versus $2.63 \pm 0.55$ ng/ml, $p < 0,05$). Kadar ADAMTS-4 serum lebih rendah pada kelompok yang diterapi MSC-WJ dibandingkan kelompok kontrol ($43,89 \pm 7,50$ ng/ml versus $47,63 \pm 5,32$ ng/ml, $p > 0,05$). Kadar iNOS serum lebih tinggi pada kelompok yang diterapi MSC-WJ dibandingkan kelompok kontrol ($28,37 \pm 4,23$ ng/ml versus $26,21 \pm 2,79$ ng/ml, $p > 0,05$). Kadar IL-4 serum lebih tinggi pada kelompok yang diterapi MSC-WJ dibandingkan kelompok kontrol ($47,95 \pm 4,88$ ng/L versus $43,90 \pm 4,99$ ng/L, $p < 0,05$).

Penelitian ini menyimpulkan bahwa terdapat perbedaan antara kadar MMP-1 dan IL-4 serum tikus OA lutut yang diterapi dengan MSC-WJ dan yang tidak diterapi. Tidak terdapat perbedaan antara kadar ADAMTS-4 dan iNOS serum tikus OA lutut yang diterapi dengan MSC-WJ dan yang tidak diterapi.



Kata Kunci : Osteoartritis, *Masenchymal Stem Cell Wharton's Jelly*, MMP-1, ADAMTS-4, iNOS dan IL-4

## Abstract

The Effect of Wharton's Jelly Mesenchymal Stem Cell on Matrix Metalloproteinase-1, A Disintegrin-Like and Metalloproteinase With Thrombospondin Motif-4, Indicible Nitric Oxide Synthase and Interleukin-4 Levels in Osteoarthritis

Experimental research in Rattus Novergicus

Endrinaldi

Osteoarthritis (OA) is generally considered a degenerative joint disease caused by biomechanical changes and the aging process. Research has revealed the role of inflammatory processes in the pathogenesis of OA. This study aimed to study the effect of Mesenchymal Stem Cell Wharton's Jelly on bioactive markers of osteoarthritis.

This research is an experimental study with the design of Posttest-Only Control Group Design. The sample consisted of 18 OA rats as a control group and 18 OA rats treated with MSC-WJ as the treatment group. OA induction is done by injection of monosodium iodoacetate (MIA) into the intra-articular right knee. Giving MSC-WJ is done at the third week after MIA induction. Levels of MMP-1, ADAMTS-4, iNOS and IL-4 rat serum were measured by ELISA method. The statistical test used is an independent t test. The value of $p < 0.05$ was said to be statistically significant.

The results showed that serum MMP-1 levels were higher in the MSC-WJ treated group than in the control group (3.96 ± 0.81 ng / ml versus 2.63 ± 0.55 ng/ml, $p < 0.05$). Serum ADAMTS-4 levels were lower in the MSC-WJ treated group than in the control group (43.89 ± 7.50 ng ml versus 47.63 ± 5.32 ng/ml, $p > 0.05$). Serum iNOS levels were higher in the group treated with MSC-WJ than in the control group (28.37 ± 4.23 ng/ml versus 26.21 ± 2.79 ng/ml, $p > 0.05$). Serum IL-4 levels were higher in the MSC-WJ treated group than in the control group (47.95 ± 4.88 ng/L versus 43.90 ± 4.99 ng/L, $p < 0.05$).

This study concluded that there were differences between the levels of MMP-1 and IL-4 serum in mouse OA knee treated with MSC-WJ and those not treated. There was no difference between the levels of ADAMTS-4 and iNOS serum in mouse OA mice treated with MSC-WJ and those not treated.



Keywords: Osteoarthritis, Wharton's Jelly Mesenchymal Stem Cell, MMP-1, ADAMTS-4, iNOS and IL-4