

INTISARI

Latar Belakang. Perubahan hormonal pascamenopause pada sebagian wanita membawa konsekuensi masalah kesehatan, baik jangka pendek maupun jangka panjang. Alternatif yang dapat diambil oleh wanita dalam mengatasi masalah kesehatan pada masa menopause adalah berolahraga secara teratur. Penelitian terdahulu membuktikan adanya perbaikan pada gejala menopause dan peningkatan hormon estrogen setelah berolahraga secara teratur. Sumber estrogen pada masa menopause adalah aromatisasi ekstragonadal. Penelitian ini bertujuan untuk mengkaji mekanisme kenaikan estrogen pada masa menopause akibat olahraga teratur dengan mengamati aromatisasi di korteks adrenal melalui pengukuran kadar testosteron adrenal, estrogen adrenal, dan ekspresi CYP19 aromatase di korteks adrenal.

Metode. Penelitian dilakukan pada 10 ekor tikus Sprague Dawley betina usia 3 bulan yang diovariektomi. Subjek dibagi 2 kelompok: Kelompok I diberi perlakuan olahraga menggunakan protokol dari Moraska *et al.* (2000), kelompok II tidak diberi perlakuan. Olahraga menggunakan *treadmill* khusus untuk tikus selama 8 minggu dengan intensitas 75%VO₂max yang dinaikkan secara bertahap. Setelah program selesai diukur kadar testosteroe adrenal, estrogen adrenal, estrogen serum dan ekspresi CYP19 aromatase di korteks adrenal.

Hasil. Didapatkan hasil pemeriksaan pada kelompok olahraga dan kelompok kontrol kadar estrogen serum masing-masing 21,58±3,01 dan 17,45±2,34 pg/ml; testosteron adrenal pada kedua kelompok <0,02 ng/ml; estrogen adrenal 12,05±0,57 dan 11,36±0,99 pg/ml; dan persentase ekspresi CYP19 aromatase 45,61±5,69 dan 26,11±3,55%. Hasil penelitian diuji dengan uji t tidak berpasangan pada tingkat kemaknaan p<0,05. Pada kelompok yang diberi perlakuan olahraga tidak terdapat perbedaan yang bermakna baik kadar estrogen serum maupun kadar estrogen adrenal dibandingkan kelompok kontrol. Terdapat perbedaan bermakna ekspresi CYP19 aromatase antara kedua kelompok.

Kesimpulan. Ekspresi CYP19 aromatase lebih tinggi akibat olahraga teratur selama 8 minggu pada masa menopause tetapi tidak didapatkan perbedaan bermakna kadar estrogen adrenal antara kelompok olahraga dan kelompok kontrol.

Kata kunci: olahraga, aromatisasi ekstragonadal, testosteron, estrogen, aromatase.

ABSTRACT

Background. Postmenopausal hormonal changes in some women bring some consequences on women's health, both short and long term. Alternatives that can be taken by women in addressing health problems in menopause is regular exercise. Previous research proved the existence of improvement in symptoms of menopause and increasing in estrogen levels after regular exercise. Source of estrogen in menopause are extragonadal aromatization. The aim of this study is to examine the mechanism of the increase in serum estrogen during menopause due to regular exercise by measuring CYP19 aromatase expression in the adrenal cortex, levels of adrenal testosterone and adrenal estrogen.

Method. The study was conducted on 10 female Sprague Dawley rats aged 3 months that have been ovariectomized. Subjects were divided into two groups: the first group was treated using exercise protocol of Moraska et al. (2000) and the second group was given no treatment. Exercise with a special treadmill for rats for 8 weeks with graded increase in intensity. After the program finished, levels of adrenal testosterone, adrenal estrogen, serum estrogens and CYP19 aromatase expression in the adrenal cortex were measured.

Results. Examination results obtained in exercise group and control group, serum estrogen levels respectively were 21.58 ± 3.01 and 17.45 ± 2.34 pg /mL; adrenal testosterone in both groups were <0.02 ng / ml; estrogen adrenal were 12.05 ± 0.57 and 11.36 ± 0.99 pg/mL, and the percentage of CYP19 aromatase expression were 45.61 ± 5.69 and $26.11 \pm 3.55\%$. The results were tested with unpaired t test at significance level $p < 0.05$. There are significant differences in CYP19 aromatase expression between the two groups. In the group treated with exercise there was no significant differences in either adrenal testosterone levels and adrenal estrogen levels than control.

Conclusion. Percentage of CYP19 aromatase expression is higher due to regular exercise for 8 weeks in ovariectomized rats. There were no significant differences in adrenal estrogen between exercise groups and control groups.

Keywords: exercise, extragonadal aromatisation, testosterone, estrogen, aromatase.