ABSTRAK

EKSPRESI BIOMARKER mRNA IL-6, TNF-α, BAX DAN IHC P53 PADA RETINA TIKUS JANTAN MODEL DM TIPE II DENGAN LATIHAN FISIK HIIT (*High Intensity Interval Training*) DAN MICT (*Medium Intensity Continuous Training*)

Muhammad Ilham Akbar[1], Muhammad Bayu Sasongko[1], Agus Supartoto[1], Nur Arfian[2]
[1]Departemen Ilmu Kesehatan Mata Fakultas Kedokteran, Kesehatan Masyarakat dan Keperawatan
Universitas Gadjah Mada – RSUP Dr. Sardjito Jogjakarta
[2]Departemen Anatomi Fakultas Kedokteran, Kesehatan Masyarakat dan Keperawatan Universitas Gadjah Mada

Latar Belakang : Biomarker inflamasi (IL-6, TNFα) dan apoptosis (Bax dan P53) diketahui meningkat pada penyakit *Diabetic Retinopathy* (DR). Latihan fisik merupakan cara untuk mengurangi progresifitas penyakit DR, terdapat 2 jenis latihan fisik yang dikenal yaitu *High Intensity Interval Training* (HIIT) dan *Medium Intensity Continuous Training* (MICT). Sampai saat ini belum diketahui jenis latihan fisik yang sesuai untuk mencegah atau mengurangi progresifitas penyakit DR.

Tujuan : Mengetahui ekspresi biomarker IL-6, TNFα, Bax dan P53 pada retina tikus jantan DM tipe II dengan perlakuan HIIT dan MICT.

Metode : Penelitian ini menggunakan tikus jantan dengan model DM tipe II dibagi 5 kelompok masing-masing Kontrol, DM 1 bulan (DM1), DM 2 bulan (DM2), DM 1 bulan+perlakuan HIIT (DM1T1) dan DM 1 bulan+perlakuan MICT (DM1T2) tiap kelompok berisi 5 sampel. Dilakukan pengambilan preparat retina dari mata tikus dan dilakukan pemeriksaan mRNA IL-6, TNFα, Bax dengan *reverse transcriptase* PCR (rt-PCR) dan ekspresi P53 dengan pemeriksaan imunohistokimia.

Hasil : Peningkatan ekspresi IL-6 yang lebih tinggi pada DM2 vs kontrol ($p<0.001$) vs DM1 ($P<0.001$) dan penurunan IL-6 pada DM1T1 vs DM2 ($P<0.001$) dan DM1T2 vs DM2 ($p<0.001$). Ekspresi TNFα meningkat pada DM2 vs kontrol ($p<0.001$) vs DM1 ($p<0.009$) dan penurunan TNFα pada DM1T1 vs kontrol ($p<0.027$) dan DM1T2 vs DM2 ($P<0.016$). Ekspresi Bax meningkat pada DM2 vs kontrol ($p<0.001$), DM2 vs DM1 ($p<0.014$) dan penurunan Bax pada DM1T1 vs DM2 ($p<0.006$) dan DM1T2 vs DM2 ($P<0.012$). Hasil imunohistokima P53 didapatkan pewarnaan cokelat lebih banyak pada sel epitel pigmen retina dan sel ganglion pada kelompok DM1 dan DM2 dibandingkan kelompok DM1T1 dan DM1T2.

Kesimpulan : HIIT maupun MICT dapat menurunkan ekspresi biomarker inflamasi dan apoptosis yang secara bermakna lebih rendah setelah perlakuan.

Kata Kunci : HIIT, MICT, IL-6, TNFα, Bax, P53

ABSTRACT

EXPRESSION OF mRNA BIOMARKER OF IL6, TNF-α, BAX AND IHC P53 IN THE RETINA OF TYPE II DM MODEL MALE RATS WITH HIIT (HIGH INTENSITY INTERVAL TRAINING) AND MICT (MEDIUM INTENSITY CONTINUOUS TRAINING)

Muhammad Ilham Akbar[1], Muhammad Bayu Sasongko[1], Agus Supartoto[1], Nur Arfian[2]
[1]Department of Opthalmology, Faculty of Medicine, Public Health, And Nursing, Gadjah Mada University, dr. Sardjito General Hospital.
[2]Department of Anatomy Faculty of Medicine, Public Health, And Nursing, Gadjah Mada University.

Background: Inflammation (IL-6, TNFα) and apoptosis (Bax and P53) biomarkers are elevated in Diabetic Retinopathy (DR). Physical exercise can reduce the progression of DR. There are 2 types of physical exercise known today, High Intensity Interval Training (HIIT) and Moderate Intensity Continuous Training (MICT). There is no known type of physical exercise that is suitable for preventing or reducing the progression of DR.
Objective: Determining the expression of biomarkers of IL-6, TNFα, Bax and P53 in the retina of male type II DM rats treated with HIIT and MICT.
Methods: This study used type II DM model male rats divided into 5 groups : Control, 1-month DM (DM1), 2-month DM (DM2), 1-month DM+HIIT treatment (DM1T1) and 1-month DM+MICT treatment (DM1T2). Each group has 5 samples. Retinal preparations were taken from mouse eyes and examined for mRNA IL-6, TNFα, Bax by reverse transcriptase PCR (rt-PCR) and P53 expression by immunohistochemical examination.
Results: On the expression of the IL-6 biomarker, it was found that the increased expression was higher in DM2 vs control ($p<0.001$) vs DM1 ($P<0.001$) and IL-6 decreased in DM1T1 vs DM2 ($P<0.001$) and DM1T2 vs DM2 ($p<0.001$). TNFα expression was increased in DM2 vs control ($p<0.001$) vs DM1 ($p<0.009$) and TNFα decreased in DM1T1 vs control ($p<0.027$) and DM1T2 vs DM2 ($P<0.016$). Bax expression was higher in DM2 vs control ($p<0.001$) vs DM1 ($p<0.014$) and Bax decreased in DM1T1 vs DM2 ($p<0.006$) and DM1T2 vs DM2 ($P<0.012$). The results of P53 immunohistochemistry showed that brown staining was more visible in retinal pigment epithelial cells and ganglion cells in the DM1 and DM2 groups than in the DM1T1 and DM1T2 groups.
Conclusion: Both HIIT and MICT can reduce the the expression of biomarkers of inflammation and apoptosis which are significantly lower after treatment.
Key Word: HIIT, MICT, IL-6, TNFα, Bax, P53