

Pengembangan program latihan fisik terstruktur berbasis kondisi pasien dalam tatalaksana diabetes melitus tipe 2 = Designing a structured training program based on patient condition for type 2 diabetes mellitus management

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20477742&lokasi=lokal>

Abstrak

ABSTRAK

Program latihan untuk penatalaksanaan Diabetes Melitus DM tipe 2 harus dipastikan aspek keamanannya, selain juga efektif dan bermanfaat. Melalui penelitian dua tahap dilakukan perancangan latihan fisik yang dievaluasi dengan randomized controlled trial RCT. Program latihan 12 minggu mengombinasikan high intensity interval training HIIT dan latihan beban tiga dan dua kali per minggu dengan peningkatan intensitas bertahap. HIIT terdiri atas perbandingan 1 : 4 menit high intensity exercise HIE dan low intensity exercise LIE. Latihan beban terdiri atas sembilan latihan untuk batang tubuh, ekstremitas atas, dan bawah. RCT diikuti 42 penyandang DM tipe 2 berusia 35-64 tahun, yang dialokasikan menjadi kelompok eksperimen dengan latihan sesuai rancangan dan kelompok kontrol dengan continuous cardiorespiratory training. Pemeriksaan tingkat kebugaran VO₂max, kontrol glikemik HbA_{1c}, dan stres oksidatif MDA dan SOD dilakukan di awal dan akhir program. Pasca latihan didapatkan nilai rerata VO₂max kelompok eksperimen 38,13 ± 5,93 mL/kg.min lebih tinggi dibandingkan kontrol 32,09 ± 5,24 mL/kg.min, p = 0,004, serta stres oksidatif menurun MDA eksperimen ? -0,14 ± 0,39 nmol/mL dibandingkan kontrol ? 0,18 ± 0,26 nmol/mL, p = 0,011; SOD eksperimen median ? 0,47 U/mL IQR 0,08-0,74 U/mL dibandingkan kontrol ? 0,14 ± 0,35 U/mL, p = 0,036. HbA_{1c} kelompok eksperimen menunjukkan penurunan ? -0,43 ± 1,01, namun tidak bermakna. Skor komposit efek latihan lebih tinggi pada kelompok eksperimen 8,72 ± 1,27 dibandingkan kontrol 7,20 ± 1,08, p = 0,001. Dengan demikian disimpulkan bahwa program latihan pada penelitian ini memberi manfaat dan dapat diimplementasikan dengan aman. Kata kunci: HIIT dan latihan beban; program latihan berbasis pasien; stres oksidatif; T2DM

ABSTRACT

Exercise programs for patients with Type 2 Diabetes Mellitus T2DM must be demonstrably safe, effective, and beneficial. Objectives. In this two-step study, a training program was designed and implemented in a randomized controlled trial RCT to meet the above criteria. The 12-week exercise program combined high intensity interval training HIIT three times per week and resistance training twice weekly, with gradually increased intensity. The HIIT element comprised 1 minute of high intensity exercise HIE and 4 minutes of low intensity exercise LIE. The resistance training element comprised nine exercises for core, upper, and lower extremities. The 42 T2DM patients who participated in the RCT were aged 35-64 years. Participants were randomly allocated to the experimental EXP group for the new training program and to the control KTR group for continuous cardiorespiratory training. Fitness level VO₂max, glycemic control HbA_{1c}, and oxidative stress MDA and SOD were measured before and after the exercise program. VO₂max was higher in EXP 38.13 ± 5.93 mL/kg.min than in KTR 32.09 ± 5.24 mL/kg.min; p = 0.004. Overall oxidative stress decreased in EXP MDA EXP ? -0.14 ± 0.39 nmol/mL as compared to KTR ? 0.18 ± 0.26 nmol/mL; p =

0.011 and SOD EXP median \pm 0.47 U/mL IQR 0.08-0.74 U/mL as compared to KTR \pm 0.14 0.35 U/mL; $p = 0.036$. EXP HbA1c also decreased, although not significantly \pm -0.43 1.01. EXP composite effects score was significantly higher 8.72 1.27 than for KTR 7.20 1.08; $p = 0.001$. The exercise program for T2DM patients was shown to be safe, with significant benefits. Keywords: glycemic control; HIIT and resistance training; oxidative stress; patient-based training program; physical fitness; T2DM