JUDUL :

EFFECT OF HIGH-INTENSITY INTERVAL TRAINING AND PRE-MEAL WATER CONSUMPTION ON LIPID PROFILE IN OVERWEIGHT AND OBESE STUDENTS

Peneliti

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Ringkasan Eksekutif

Introduction: Obesity and overweight in adolescents and adults are associated with chronic diseases. The objective of this study was to determine the effect of high-intensity interval training and pre-meal water intake on the lipid profile of overweight and obese students. Methods: This was a pre-post experimental study. Twenty-seven overweight and obese students (mean BMI 26.0±3.1 kg/m2 and mean age 19.7±0.7 years) were divided randomly into three groups. The first group (n=9; BMI=26.6±3.6 kg/m2) received Plain Water Intake (PWI) intervention, whereby students received three bottles of plain water (600 mL) per mealtime (total 1.8 L/ day) and consumed ad libitum 30 to 45 minutes before mealtime (breakfast, lunch, and dinner). The second group (n=9; BMI=25.9±2.4 kg/m2) received High-Intensity Interval Training (HIIT) intervention and underwent three exercise sessions per week (18 minutes/day; 70–85% of HRmax) that was introduced through a video recording. The last group (n=9; BMI= 25.7±3.4 kg/m2) received a combination of PWI+HIIT intervention. Nutritional status, nutrient intake, and lipid profile [total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C), and low-density lipoprotein cholesterol (LDL-C)] were assessed before and after the interventions. Data were analysed using paired sample t-test and Analysis of Variance (ANOVA). Results: The PWI group showed a significant increase in HDL-C, while the HIIT group showed a significant reduction in TC ($p<0.05$). On the other hand, the PWI+HIIT group showed significant improvements in lipid profile (TC, TG and HDL-C) ($p<0.05$). Conclusion: A combination of PWI+HIIT intervention may be effective in improving lipid profile.

Kata Kunci :

HKI dan Publikasi

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Latar Belakang

Overweight is a global public health problem that has a negative impact on health. Obesity has become a risk factor for various degenerative diseases, such as coronary heart disease, type 2 diabetes mellitus and osteoarthritis (Aronne & Isoldi, 2007). The prevalence of overweight has increased in recent years. Therefore, many efforts are required to keep weight within the normal range. In 2016, there were 39% of adults (39% men and 40% women) who experienced overweight and 13% who were obese; meanwhile, over 340 million children and adolescents were overweight and obese (WHO, 2016). Based on these several studies, the researchers of this study were interested in studying the combination of plain water intake(PWI) and HIIT intervention, and their effects on lipid profile (TC, TG, HDL-C, and LDL-C). This study aimed to analyse the efficacy of HIIT, pre- meal water consumption (PWI), and a combination of both interventions on lipid profile in overweight and obese students.

Metode

The study was a pre-post experimental study with three intervention groups. This research was conducted from October 2014 to April 2015 at the Sport Nutrition and Nutritional Status Laboratory, IPB University.

The duration of intervention administered for each group was two months. Different treatments were given for each group: pre-meal water consumption (PWI group, n=9) in the first group, HIIT (HIIT group, n=9) in the second group, and a combination of PWI and HIIT (PWI+HIIT group, n=9) in the third group. PWI intervention was given to subjects by managing the pattern of plain water consumption; that was, drinking a 600 mL bottle before each mealtime with a total water intake of 1.8 L/day despite the fact that 1.5 L/day, 30-50 minutes before each meal has been regarded as effective (Davy et al., 2009). Plain water intake was set as follows: one bottle of 600 mL water

Hasil dan Manfaat

The subjects of this study were 27 people ranging from 17-19 years old. The mean age for each group were 19.9±0.6 years old (PWI group), 19.8±0.4 years old (HIIT group), and 19.5±0.9 years old (PWI+HIIT group), respectively. Lipid profile described that TC found in the HIIT group was higher than the others. Subjects' characteristics based on intervention groups are presented in Table 1.

Types of beverages and the amount of water intake were analysed in this study. The types of beverages analysed were plain water, carbonated drinks, electrolytes drinks, coffee and tea, juice or fruit juice, and milk. Mean consumption of plain water in the PWI, HIIT, and PWI+HIIT groups were 2300±737 mL, 1752±791 mL, and 2500±719 mL, respectively. Water intake and energy intake from beverages in the PWI+HIIT group was higher than the other groups. Total water intake and energy intake according to types of beverages consumed are shown in Table 2.

Percent body fat (PBF) and BMI of the PWI+HIIT group showed the most significant decrease of -4.1±4.7% and -0.05±3.3 kg/m^2. Based on ANOVA, there was no significant difference in PBF and BMI among the three groups. However, based on paired *t*-test for before and after intervention, there was a change in PBF and BMI in the PWI+HIIT group. Energy intake of the PWI group was 1964±527 kcal, 1933±248 kcal for the HIIT group, and 2002±563 kcal for the PWI+HIIT group. Protein intake for the PWI group was 52.4±15.1 g, 50.5±14.6 g for the HIIT group, and 46.2±12.5 g for the PWI+HIIT group. There was no significant difference in nutrient intake ($p>0.05$).

After an eight-week intervention, it was shown that HDL-C of the PWI group significantly increased and TC of the HIIT group significantly reduced ($p<0.05$). Compared to the other groups, PWI+HIIT group had a significant decrease in TC and TG, with improved HDL-C ($p<0.05$). The average nutrient intake, nutritional status, and lipid profile of the subjects at baseline and after eight weeks of intervention are presented in

before each mealtime (breakfast, lunch and dinner) ad libitum during the intervention period.

HIIT intervention was given 3 times/week (70–85% of HR-max) for 18 minutes each session (Eather et al., 2019). Heart rate (HR) was measured by a smartphone application. A recorded video was utilised to ease the subjects in following the HIIT movements. The HIIT training protocol was divided into three parts: warm up, four sets of 20-s body weight HIIT workout with 10-s rest (broad jumps, squat jump, switch foot jumps, and squad jumps squad) and cool down. Training intensity was gradually increased during each exercise.
The compliance of subjects towards PWI and HIIT interventions was monitored during the study. Supervision through in-person interviews was conducted to figure out what the subjects were experiencing during the interventions. Each subject consumed a total of 84 bottles of water per month, and underwent three times/week of HIIT intervention.

Table 3. After the intervention, the compliance of the three intervention groups had an adherence rate of >90% (PWI: 98.8%; HIIT: 98.1%; PWI + HIIT: 97.7%).

A combination of PWI and HIIT may be effective in improving the lipid profile of obese and overweight students. The intervention decreased the levels of TC (mg/dL) and TG (mg/dL), while improved HDL-C. For further studies, inflammatory biomarkers and other fitness components such as speed, flexibility, strength, and endurance can be added as variables.

Skema LITABMAS

Penelitian Mandiri (bagian dari Tesis)

Ucapan terimakasih

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