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High-intensity interval training and β -hydroxy- β -methylbutyric free acid improves aerobic power and metabolic thresholds

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Abstract

Background

Previous research combining Calcium β -hydroxy- β -methylbutyrate (CaHMB) and running high-intensity interval training (HIIT) have shown positive effects on aerobic performance measures. The purpose of this study was to examine the effect of β -hydroxy- β -methylbutyric free acid (HMBFA) and cycle ergometry HIIT on maximal oxygen consumption ($\dot{V}O_{2peak}$), ventilatory threshold (VT), respiratory compensation point (RCP) and time to exhaustion (T_{max}) in college-aged men and women.

Methods

Thirty-four healthy men and women (Age: 22.7 ± 3.1 yrs ; VO_{2peak} : 39.3 ± 5.0 ml·kg⁻¹·min⁻¹) volunteered to participate in this double-blind, placebo-controlled design study. All participants completed a series of tests prior to and following treatment. A peak oxygen consumption test was performed on a cycle ergometer to assess VO_{2peak} , T_{max} , VT, and RCP. Twenty-six participants were randomly assigned into either a placebo (PLA-HIIT) or 3 g per day of HMBFA (BetaTor™) (HMBFA-HIIT) group. Eight participants served as controls (CTL). Participants in the HIIT groups completed 12 HIIT (80-120% maximal workload) exercise sessions consisting of 5–6 bouts of a 2:1 minute cycling work to rest ratio protocol over a four-week period. Body composition was measured with dual energy x-ray absorptiometry (DEXA). Outcomes were assessed by ANCOVA with posttest means adjusted for pretest differences.

Results

The HMBFA-HIIT intervention showed significant ($p < 0.05$) gains in VO_{2peak} , and VT, versus the CTL and PLA-HIIT group. Both PLA-HIIT and HMBFA-HIIT treatment groups demonstrated significant ($p < 0.05$) improvement over CTL for T_{max} and RCP with no significant difference between the treatment groups. There were no significant differences observed for any measures of body composition. An independent-samples t-test confirmed that there were no significant differences between the training volumes for the PLA-HIIT and HMBFA-HIIT groups.

Conclusions

Our findings support the use of HIIT in combination with HMBFA to improve aerobic fitness in college age men and women. These data suggest that the addition of HMBFA supplementation may result in greater changes in VO_{2peak} and VT than HIIT alone.

Study registration

The study was registered on ClinicalTrials.gov (ID [NCT01941368](https://clinicaltrials.gov/ct2/show/study/NCT01941368)).

Keywords: High-intensity interval training; β -Hydroxy- β -Methylbutyric free acid; Aerobic; Endurance; VO_{2peak} ; Respiratory compensation point; Ventilatory threshold

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