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Beta-alanine supplementation and high-intensity interval training augments metabolic adaptations and endurance performance in college-aged men

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Poster presentation

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Background

A randomized, double-blind, placebo-controlled study was conducted to evaluate the effects β -alanine supplementation and high-intensity interval training (HIIT) on endurance performance.

Methods

Forty-six college-aged men (Age: 22.2 ± 3.3 yrs, VO_{2peak} : 42.6 ± 6.2 ml \cdot kg \cdot min⁻¹, 3.3 ± 0.6 l \cdot min⁻¹) volunteered to participate. In a random fashion, all subjects were placed into one of three groups: placebo (PL – 16.5 g of flavored dextrose powder per packet; n = 18), β -alanine (BA – 1.5 g β -alanine plus 15 g of flavored dextrose powder per packet; n = 18) or control (n = 10) groups. Each treatment group ingested one packet 4 times per day (total of 6 g/day) for the first 21-day adaptation phase, followed by 2 times per day (3 g/day) for the subsequent 21 days. All participants performed a continuous VO_{2peak} test on a cycle ergometer (Corval Lode, Gronigen, the Netherlands) which was further used to establish ventilatory threshold (VT), and total time to exhaustion (VO_{2TTE} , seconds) at pre-, mid- and post-testing. Total work done (TWD) was also measured, calculated from the total time (T; seconds) completed at a workload corresponding to 110% of their maximal power output (watt, W) determined from the VO_{2peak} test [TWD (kJ) = (T \times W)/1000]. Following ini-

tial testing, all participants in the BA and PL groups engaged in a 3 week supplementing and training adaptation phase. Each training session in the adaptation phase consisted of 5 bouts of a 2:1 minute cycling work to rest ratio, introduced in an undulating progression starting at 90% VO_{2peak} power output and reaching 110%. The second 3 week training phase progressed, reaching intensities up to 115% of VO_{2peak} . Body composition was assessed using air displacement plethysmography (Bod Pod®) at pre- mid- and post-testing. Separate one-way analyses of covariance were used to identify and group (BA vs. PL. vs. CON) \times time (Mid- vs. Post-) interactions, adjusting mean post-test values for differences in the mid-test scores, due to the supplementing and training adaptation phase.

Results

There was a significant difference among all post-test GXT variables (VO_{2peak} , VO_{2TTE} , and VT) and TWD, after adjusting for the mid-test adaptation values ($p \leq 0.000$). However, there were no differences between treatment group means. Individual responses indicated a greater number of the BA participants improving in VO_{2peak} (83%) and VO_{2TTE} (72%) performance over the PL group (61% and 56%, respectively). Furthermore, bonferroni-corrected post-hoc pairwise comparisons indicated the significant increases in TWD were greater for the BA group

than the CON ($p = 0.029$). There were no significant changes in body composition following training and supplementing.

Conclusion

Three weeks of combined β -alanine supplementation and HIIT, following a 21-day β -alanine loading and HIIT adaptation phase, significantly improves aerobic performance. The improvements in performance may be attributed to a greater reliance on aerobic metabolism due to chronic adaptations to HIIT, in combination with an improved muscle buffering capacity as a result of an increase in intramuscular carnosine levels.

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