

Summary

Effect of curcumin supplementation on selected blood biochemical markers in long-distance runners

The objective of this study was to evaluate the effects of 6-week curcumin supplementation at a dose of 2g/day on blood morphology, markers of prooxidant-antioxidant balance, inflammation, skeletal muscle damage and serum level of brain-derived neurotrophic factor (BDNF) in long-distance (amateur) runners during the preparatory period of the training cycle.

The study was based on 30 long-distance runners who had been recruited from Silesian amateur running clubs and who had taken curcumin or placebo supplementation at a dose of 2x1g for a 6 weeks period during their preparation phase. The study was conducted in two stages. In the first, baseline anthropometric parameters were measured, and the participants were divided into two groups supplemented with curcumin (n=15) and placebo (n=15). The participants performed a test to refuse of increasing intensity with a change in angle of slope after reaching a speed of 14 km/h. Blood for biochemical assays was collected at rest, at 3 minutes post-exercise and at 1 hour of restitution. For a period of 6 weeks, participants took a dietary supplement (curcumin) or placebo at a dose of 2g per day. After 6 weeks, the study procedure was repeated. The study was conducted at certified laboratories: Laboratory of Human Functional Research, Laboratory of Biochemistry at the Academy of Physical Education in Katowice. Activities of following enzymes: superoxide dismutase - SOD, catalase - CAT, glutathione peroxidase - GPx and concentrations of reduced glutathione - GSH, uric acid - UA, total antioxidant and oxidative status - TAS and TOS, sirtuin 3 - SIRT3, malondialdehyde - MDA, DNA oxidative damage marker - 8-OHdG were used to assess the prooxidant-antioxidant balance. Skeletal muscle damage was assessed by activity of creatine kinase - CK, lactate dehydrogenase - LDH, alanine and aspartate aminotransferase - ALT and AST and myoglobin (Mb) concentration. Concentrations of interleukin-1 β (IL-1 β), interleukin-6 (IL-6), C-reactive protein (CRP), tumor necrosis factor (TNF α) were used to assess inflammation. Serum levels of brain-derived neurotrophic factor (BDNF) were also evaluated.

Descriptive statistics were used in this study: arithmetic means and standard deviations ($M\pm SD$) and medians and quarter deviations ($Me\pm QD$). Homogeneity of variance and sphericity were assessed using Levene's test and Mauchly's test, respectively. The significance of intergroup differences was determined by the U Mann-Whitney test, while intragroup

differences were assessed by the Wilcoxon matched-pairs rank test and the Friedman rank test, followed by the Dunn's post-hoc test when necessary. The significance level in all tests was $\alpha=0.05$.

Curcumin supplementation was found to have no significant effect on selected biochemical parameters in athletes. The markers that characterize prooxidant-antioxidant balance did not change significantly, which did not confirm the research hypothesis. After curcumin supplementation at a dose of 2x1g per day, a slight decrease in inflammation was observed in the supplemented group, while there were no significant changes in markers of skeletal muscle damage. The SIRT3 analysis performed showed that the applied physical exercise combined with curcumin supplementation does not affect its concentrations and changes in the activity of antioxidant enzymes.

In view of the results obtained after the use of curcumin supplementation at a dose of 2g per day combined with physical exercise on selected biochemical markers, further studies at higher doses are needed to confirm the benefits of curcumin supplementation in long-distance runners.