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Effect of extracted garlic powder ingestion for two months on exercise-induced immunological responses

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ABSTRACT

Introduction. Exhaustive exercise is associated with an increased risk of upper respiratory tract infection. Previously, allicin supplementation has been reported to reduce the incidence of common cold symptoms and production of exercise-induced interleukin (IL)-6. However, it is not clear if daily ingestion of the edible portion of whole garlic (*Allium sativum*) alters the exercise-induced immunological response. The present study investigated the effects of extracted garlic powder ingestion for 2 months on immune cell counts, natural killer cell activity (NKCA), as well as changes in cytokines, cortisol, and lactic acid in response to high-intensity cycling exercise.

Methods. The present study employed a before-after study design. Six sedentary male participants (age, 22.0±0.3 years) consumed extracted garlic powder for 2 months, and underwent 45 minutes of cycling exercise at 80% of the heart rate reserve once before and once after the supplementation period. A thousand milligrams of extracted garlic powder, comparable to 6 g (1 clove) of raw garlic, was ingested every day. Blood samples were obtained at the following five time points: before exercise, 0 min, 30 min, 60 min, and 120 min after exercise. We measured NKCA, leukocyte counts, neutrophil counts, lymphocyte counts, as well as levels of serum IL-6, IL-10, cortisol, and lactic acid. Repeated measures ANOVA was used for statistical analyses. When interaction effects were significant, measurement values at the various time points were compared between pre- and post-supplementation period using the paired t-test. Changes were deemed statistically significant when $p<0.05$.

Results. We observed no significant difference in pre-exercise measurements between pre- and post-supplementation periods. In addition, we found no significant interaction effect for leukocytes, neutrophils, NKCA, IL-10, and cortisol. However, we did identify a significant interaction effect for lymphocytes, IL-6, and lactic acid ($p=0.033$, $p=0.030$, and $p<0.001$, respectively). Lymphocyte counts were significantly lower post-supplementation relative to pre-supplementation immediately after exercise ($p=0.014$). In addition, IL-6 was significantly lower post-supplementation relative to pre-supplementation immediately and 30 minutes after exercise ($p=0.015$ and $p=0.018$, respectively). Lactic acid levels were significantly lower post-supplementation relative to pre-supplementation immediately after exercise ($p=0.018$).

Conclusions. The extracted garlic powder did not significantly influence exercise-induced responses by leukocytes, neutrophils, NKCA, IL-10, or cortisol. However, exercise-induced responses by lymphocytes, IL-6, and lactic acid were suppressed after ingestion of extracted garlic powder. Thus, daily ingestion of the edible portion of whole garlic may suppress exercise-induced immunological responses and lactic acid levels.