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Poster presentation

An evaluation of the effects of inositol-stabilized arginine silicate (ASI; Nitrosigine®) in preventing the decline in cognitive function caused by strenuous exercise

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Abstract

Background: Inositol-stabilized arginine silicate (ASI; Nitrosigine®) is a popular pre-workout ingredient that has been shown to increase nitric oxide production, blood flow, muscle recovery, energy, and cognitive function. ASI has been shown to significantly increase mental acuity, focus and processing speed within 15 minutes of taking a single dose [1]. However, the effect of ASI on cognitive function following exercise had not yet been evaluated. Because intense physical activity can cause mental fatigue which can then have a negative impact on decision making and physical performance, preventing cognitive impairment would be advantageous for athletes in maintaining focus and mental acuity. A randomized, double-blind, placebo-controlled, crossover study evaluated the effects of an acute dose of ASI (1,500 mg) on cognitive function following intense aerobic exercise.

Materials & Methods: Twenty-four healthy male adults 18-40 years of age and BMI 18.5-30 kg/m^2 were randomized equally to two study arms, separated by a 2-week washout period. Participants took a single dose of ASI (1,500 mg) or placebo 30 minutes prior to a treadmill maximally Graded Exercise Test (mGXT). A Trail Making Test (TMT), composed of two parts (TMT-A and TMT-B) was used to measure cognitive function prior to dosing and immediately after exercise. The time to complete the TMT measured mental acuity, focus and processing speed, with an increase in time indicating a decrease in cognitive function, and a decrease in time indicating an improvement in cognitive function.

Results: A single dose of ASI significantly improved cognitive function parameters of mental acuity, focus and processing speed after intense exercise, compared to placebo ($p \leq 0.05$). Following strenuous exercise, time to complete TMT-A and TMT-B increased by a significant 51% and 11% respectively in the placebo group, while it decreased by 5% for TMT-A and 7% for TMT-B when participants consumed an acute dose of ASI ($p \leq 0.05$; Figure 2,3).

Conclusions: The results of this study showed that ASI prevents the decline in cognitive function seen following strenuous exercise. Acute consumption of ASI prevented the intense exercise induced cognitive function decline of 51% seen in the placebo. These results could be of interest to individuals looking to maintain a strong cognitive state after expending energy during intense athletics, as well as everyday life.

Background

Inositol-stabilized arginine silicate (ASI; Nitrosigine®) is a sports nutrition ingredient intended to improve performance. ASI's unique formulation utilizes an inositol-stabilized bonded arginine silicate which has been shown to enhance the bioavailability and absorption of arginine and silicon. A recent study found that a single dose of ASI significantly increased plasma arginine levels up to six hours post-dose [2]. Other clinical data support the use of ASI to improve blood flow, muscle growth and recovery, energy, and cognitive function.

Prolonged strenuous activity, such as intense athletic events that are fast-paced and cognitively demanding, can cause mental fatigue. Studies have shown that mental fatigue impairs athletes' perceptual and motor skills, as well as sport-specific technical performance [3], therefore demonstrating the importance of maintaining a strong cognitive state during intense exercise. By mitigating the cognitive fatigue that results from strenuous exercise, athletes could remain focused and energized, and in turn, perform physically and mentally well for prolonged periods. Therefore, the following clinical study was carried out to examine ASI's impact on cognitive function following strenuous exercise.

Materials & Methods

A randomized, double-blind, placebo-controlled, crossover clinical trial of an inositol-stabilized arginine silicate dietary supplement (ASI; Nitrosigine®) on sports performance endpoints. Twenty-four healthy male participants (aged 18-40, BMI 18.5-30 kg/m^2) received a single oral dose of ASI (1,500 mg) or placebo in a random sequence, with a 14-day washout period between test products. During the study visits, participants took a single dose of ASI or placebo 30 minutes prior to exercise. After supplementation, participants performed a Maximally Graded Exercise Test (mGXT), where they exercised to exhaustion at increasing workloads on a treadmill. TMT-A and TMT-B were completed prior to and immediately after exercise. TMT-A connects an ascending sequence of 25 numbers, while TMT-B connects an alternating sequence of 25 numbers and letters in numerical and alphabetical order, alternating between the numbers and letters (Figure 1). TMT completion was timed. A decrease in time indicated cognitive improvement and an increase indicated cognitive decline.

Results

Trail Making Test A and B

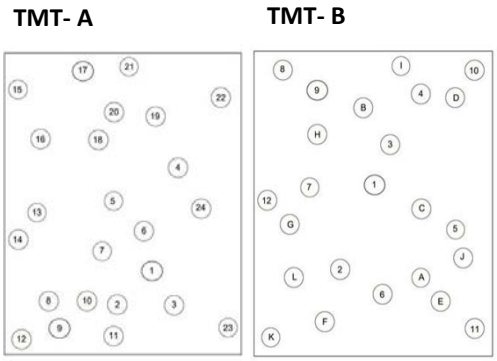

Figure 1. Structure of Trail Making Test (TMT) parts A and B. For TMT-A, lines are drawn from 1 to 2, 2 to 3, and so on until completion. For TMT-B, lines are drawn from 1 to A, A to 2, 2 to B and so on until completion.

TMT-A Performance

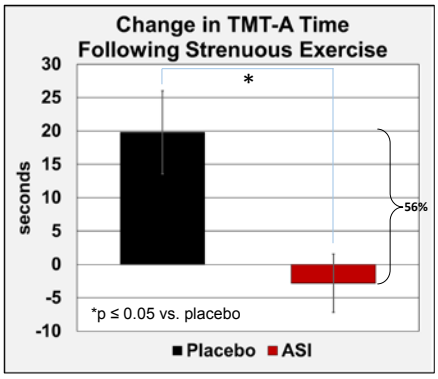

Figure 2. TMT-A time after exercise and supplementation with study product. TMT-A time decreased by 2.8 seconds (-5%) in the ASI group, while time increased by 19.8 seconds (+51%) in the placebo group. There was a 56% difference in TMT-A time between groups.

TMT- B Performance

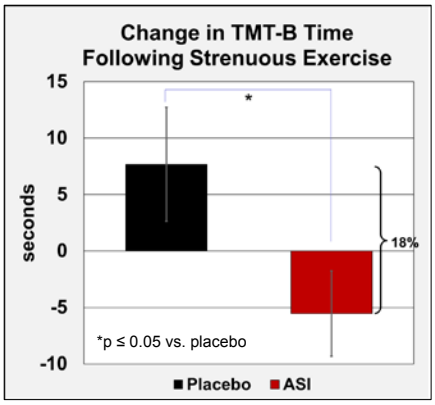

Figure 3. TMT-B time after exercise and supplementation with study product. TMT-B time decreased by 5.5 seconds (-7%) in the ASI group, while time increased by 7.7 seconds (+11%) in the placebo group. There was a 18% difference in TMT-B time between groups.

Discussion and Conclusions

In a previous clinical study, ASI was shown to significantly improve mental flexibility, processing speed, and executive functioning as demonstrated by a greater reduction in TMT-B time compared to placebo after a single dose. Because strenuous exercise impairs cognitive function, this clinical study examined the effects of an acute intake of ASI on cognitive function following intense aerobic exercise. Study results showed that strenuous exercise impairs TMT-A and TMT-B performance in participants taking placebo. Study results showed that ASI significantly improved the change in TMT-A and TMT-B performance from baseline to post-exercise, demonstrated by a decrease in time to completion in the ASI group verses an increase in time to completion in the placebo group. ASI prevented the 51% cognitive decline that was seen in the placebo group after strenuous exercise. The results of this study support the use of ASI as a sports nutrition ingredient to prevent mental fatigue, which is associated with improvements in cognitive and physical function during periods of intense physical activity.

References

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