Supplementary Material

Supplementary materials and methods

Cardiovascular & blood variables

Blood glucose
Immediately after analyzing the blood lactate levels, the blood glucose levels were analyzed using ACCU-CHEK Active Glucometer & strip (Roche®, Germany).

Peripheral oxygen saturation and pulse rate
Peripheral oxygen and pulse rate were measured using Innovo Deluxe Fingertip Pulse Oximeter iP900AP (Innovo Medical, Stafford, USA). Once the subject inserted his left index finger in the oximeter, two types of lights passed through the finger. The intensity of each light was calculated to measure the oxygen saturation and pulse.

Brain-Derived Neurotrophic Factor (BDNF)
While measuring blood lactate and glucose levels, approximately 30 µl of blood from the fingertip was collected in a heparin tube using a pipette tip. After collecting the blood, the sample was centrifuged at 4000 rpm for 10 min at 4°C, and approximately 4 µl of supernatant plasma was transferred to a 2-ml tube and stored at −80°C until further analysis. The blood BDNF level was analyzed using Total BDNF Quantikine ELISA Kit (R&D systems, USA), and the measurement was repeated three times for each set (pre-exercise, post-exercise, post 30min).

Psychological variables
Psychological variables of participants such as arousal, mental fatigue, and concentration were measured. The arousal level was assessed using the FAS. The answers range from 1 (very low) to 6 (very high) (Hashimoto et al., 2018). The levels of mental fatigue and concentration were measured using the VAS, ranging from 0 (not at all) to 100 mm (extremely), and subjects marked the extent of the feeling (Hashimoto et al., 2018). Both FAS and VAS were measured using Adaptive Visual Analog Scales (AVAS) software (Marsh-Richard, Hatzis, Mathias, Venditti, & Dougherty, 2009).

Accuracy rate and total reaction time of the Color-Word Stroop Test (CWST)
The accuracy rates of all the tasks in the Stroop test were checked. In addition, the total time to perform the Stroop test was measured.

Pilot test to set up the experimental beverage
Few previous studies have focused on the effect of lactic acid consumption in humans; and in the rare few, the manufacturing process of the consumed lactic acid has not been clearly presented. Therefore, several pilot tests were conducted to establish the proper concentration of the lactic acid drinks to be used in this experiment. To determine the solvent needed to make a lactic acid beverage, 1 ml of 90% lactic acid solution was added to 250 mL of water. However, the pH of the lactic acid drink was 1.8, making it impossible to drink because of its extremely sour taste. Even after 200 µl of the same lactic acid solution was added to 250 mL of water, the pH of the beverage was 2.4, and the sour taste was still strong. Therefore, an alkaline sports drink (Pocari Sweat®, Otsuka Pharmaceutical, Japan) was added to weaken the sourness and acidity.

Since the experimental drinks offered to both groups used the sports drink as a solvent, the effects of the other nutrients of the sports drink on the experiment were not completely controlled. Nevertheless, the only difference between the beverages offered to the two groups was the presence or absence of lactic acid solution ie 1/1000th of the total volume. Therefore, we concluded that the other nutrients contained in the sports drink would not significantly affect the results of this experiment.

REFERENCES