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EFFECTS OF 5-AMINOLEVULINIC ACID WITH IRON SUPPLEMENTATION ON RESPIRATORY RESPONSE TO EXERCISE AND INTERVAL WALKING TRAINING ACHIEVEMENT IN OLDER WOMEN AGED MORE THAN 75 YEARS

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Exercise training above a given intensity is necessary to prevent deterioration of physical fitness with aging and age-associated diseases; however, physical barriers hinder old people from daily exercise training, which might be partially due to mitochondrial dysfunction. Because 5-aminolevulinic acid (ALA), a precursor of heme, is reported to improve the mitochondrial function, we examined whether 5-aminolevulinic acid with sodium ferrous citrate (SFC) improved respiratory response during cycling exercise and increased voluntary achievement of interval walking training (IWT) in very old women (≥ 75 years).

Fifteen women [78.4±3.1 (SD) yrs] without exercise habits participated in this study. The study was conducted in a placebo-controlled, double-blind crossover design. All subjects underwent two trials for 7 days each in which they performed IWT with ALA+SFC (100 and 115 mg/day, respectively) or placebo supplement intake (CNT), intermittently with a 12-day washout period. Before and after each trial, subjects underwent a graded cycling test, and oxygen consumption rate ($\dot{V}O_2$), carbon dioxide production rate ($\dot{V}CO_2$), and lactate concentration in plasma ($[Lac^-]_p$) were measured. Furthermore, for the 2nd to 5th days of the supplement intake period in each trial, exercise intensity for IWT was measured by accelerometry.

We found that in the ALA + SFC trial, increases in $\dot{V}O_2$ and $\dot{V}CO_2$ during graded cycling were attenuated ([before vs after] x workload; both, $P<0.01$), accompanied by a 9% reduction in $[Lac^-]_p$ (before vs after, $P=0.012$), while all remained unchanged in the CNT trial ($P>0.46$). Furthermore, energy expenditure and time at fast walking were 25% ($P=0.032$) and 21% ($P=0.022$) higher during the ALA+SFC than the CNT intake period, respectively.

Thus, ALA+SFC supplementation improved respiratory response and decreased $[Lac^-]_p$ during exercise and thereby improved IWT achievement at fast walking in very old women.

Key words: 5-aminolevulinic acid, very old women, interval walking training, training achievement