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Hydrolyzed protein supplementation improves protein content and peroxidation of skeletal muscle by adjusting the plasma amino acid spectrums in rats after exhaustive swimming exercise: a pilot study

Xinvin Wang^{1†}, Chenlin Niu^{2†}, Jun Lu³, Nina Li¹ and Jieshou Li^{1*}

* Corresponding author: Jieshou Li feonix@163.com

† Equal contributors

Author
Affiliations

¹ Research Institute of General Surgery, Jinling Hospital, Medical School, Nanjing University, 305 East Zhongshan Road, Nanjing 210002, Jiangsu Province, People's Republic of China

² Department of ICU, Brain Hospital, Nanjing Medical University, 264 Guangzhou Road, Nanjing 210029, Jiangsu Province, China

³ Department of Orthopedics, Zhongda Hospital, Southeast University, 87 Dingjiaqiao, Nanjing 210009, Jiangsu Province, China

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Abstract

Background

This study was designed to evaluate the effects of hydrolyzed protein supplementation upon skeletal muscle total protein and peroxidation in rats following exhaustive swimming exercise.

Methods

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Twenty-four rats were randomized to 4 experimental groups (n=6 per group): control group fed standard diet without exercise (SD), exercise (EX), exercise plus standard diet for 72 hours (EX + SD), and exercise plus standard diet supplemented with hydrolyzed protein (2 g/kg/d) for 72 hours (EX +HP). Immediately following exercise, the EX group was euthanized for collecting plasma and skeletal muscle samples. The EX +SD and EX +HP groups were fed their respective diets for 72 hour still plasma and skeletal muscle collection. Skeletal muscle samples were used to measure levels of total protein (TP), malondialdehyde (MDA), and protein carbonyl (PC). Plasma samples were used to analyze the amino acids spectrum.

Results

Compared with the EX +SD, EX +HP presented the significantly increased TP ($P=0.02$) and decreased MDA and PC levels ($P=0.035$). MDA was negatively correlated with the methionine levels. Moreover, EX +HP maintained higher levels of plasmaleucine, isoleucine, and methionine than EX +SD, which may be associated with the increased skeletal muscle TP levels observed ($P<0.05$).

Conclusions

These results collectively suggest that hydrolyzed protein supplementation can improve skeletal muscle TP and ameliorate peroxidation damage in rats subjected to exhaustive exercise stress, which may be, at least in part, related with the maintenance of plasma leucine, isoleucine, and methionine levels.

Keywords: Protein hydrolysates; Oxidative stress; Amino acid spectrum; Physical training

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