Hyperimmune Egg Protein Decreases Submaximal Heart Rate and Increases Peak Power

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Abstract

Hyperimmune egg protein (HIE) is a powdered, pure egg product derived from chicken hens immunized with more than 26 killed pathogens (e.g., Shigella, Staphylococcus, Escherichia coli, Salmonella, and Streptococcus) of human origin. Anecdotal evidence suggests that HIE supplementation improves performance and shortens recovery time after exercise. **PURPOSE:** To determine whether 10 d of oral HIE supplementation altered submaximal or maximal exercise responses. **METHODS:** Twenty-four recreationally active males aged 23.6 ± 0.8 yrs, height 176 ± 2 cm, weight 69.2 ± 0.6 kg and 17.1 ± 1.5 % body fat were randomly assigned to either HIE (n=12) or an egg protein placebo (PLA) group. Participants abstained from their regular exercise routine for the duration of the study and were supplemented with 4.5 g·d^{-1} for 2 d, 9 g·d^{-1} for 2 d and 13.5 g·d^{-1} for 6 d. HIE and PLA supplements were identical in appearance and taste before and after mixing with 237 mL of low carbohydrate milk. On days 1, 8 and 10, participants performed three 5 min submaximal exercise bouts on a treadmill at 0%, 3% and 6% grade with constant speed for each subject. HR was continuously monitored. Each participant also performed a Wingate test. ANCOVA was used to determine significant differences between or within the groups during the 10 d of supplementation with initial differences between groups serving as a covariate. Significance was set at α = 0.05. **RESULTS:** Change in HR from Day 1, at all submaximal intensities, was significantly lower (p<0.05) between HIE and PLA on Day 8 (0%: ΔHIE -2 ± 3 b·m^{-1}, ΔPLA 0 ± 2 b·m^{-1}; 3%: ΔHIE -3 ± 2 b·m^{-1}, ΔPLA -2 ± 1 b·m^{-1}; 6%: ΔHIE -4 ± 2 b·m^{-1}, ΔPLA -1 ± 1 b·m^{-1}) and Day 10 (0%: ΔHIE -2 ± 3 b·m^{-1}, ΔPLA 0 ± 2 b·m^{-1}; 3%: ΔHIE -6 ± 3 b·m^{-1}, ΔPLA -1 ± 2 b·m^{-1}; 6%: ΔHIE -6 ± 2 b·m^{-1}, ΔPLA -1 ± 2 b·m^{-1}). Peak power was significantly greater (p<0.05) between HIE and PLA on Day 8 (ΔHIE 46 ± 32 Watts, ΔPLA -26 ± 26 Watts) as well as within HIE from Day 1 to Day 10 (ΔHIE 54 ± 22 Watts, ΔPLA 8 ± 28 Watts). **CONCLUSIONS:** These data suggest that oral supplementation of hyperimmune egg for 10 d resulted in a significantly lower submaximal HR and higher peak power. However, the prospective mechanisms related to the increase in submaximal work efficiency and greater power production, in response to HIE supplementation, remain to be identified.

Introduction

Hyperimmune Egg (HIE) is a powdered, pure egg product derived from chicken hens immunized with more than 26 dead pathogens (e.g., Shigella, Staphylococcus, Escherichia coli, Salmonella, Pseudomonas, Klebsiella pneumonae, Haemophilis, and Streptococcus) of human origin.

Oral supplementation of HIE's specific immunoglobulins and immunomodulatory factors results in their digestion and absorption by the body. Once absorbed into the body these pathogens activate the autoimmune system which is responsible for protecting the body from foreign invading pathogens (i.e., similar to how vaccines function to protect against disease).

Enhancement of the autoimmune system may provide the body with the ability to initiate an enhanced activation of the processes associated with biological repair of damaged muscle tissue from a previous bout of intense exercise.

Improved recovery from previous exercise should ultimately increase submaximal and/or maximal exercise performance.

Purpose

The purpose of this investigation was to determine whether 10 d of oral Hyperimmune egg supplementation altered submaximal cardiovascular or peak anaerobic power exercise responses.

Methods

Twenty four male participants were randomly assigned to one of two groups that orally supplemented with 4.5 g·d^{-1} for 2 d, 9 g·d^{-1} for 2 d and 13.5 g·d^{-1} for 6 d of either Hyperimmune Egg protein (HIE) or an egg protein placebo (PLA).

HIE and PLA supplements were identical in appearance and taste before and after mixing with 237 mL of low carbohydrate milk.

On days 1, 8 and 10, participants performed three 5 min submaximal exercise bouts on a treadmill at 0%, 3% and 6% grade with constant speed (i.e., 6 mph) for each subject. HR was continuously monitored with a Polar heart rate monitor.

Each participant performed a 30 sec Wingate test using 7.5% of their own body mass.

Participants abstained from their regular exercise routine for the duration of the study.

Subject Characteristics

Group	n	Age (years)	Height (cm)	Mass (kg)	Body Fat (%)
PLA	12	23.5 ± 1.2	175.6 ± 2.0	81.11 ± 4.25	18.2 ± 2.5
HIE	12	23.8 ± 1.2	175.9 ± 2.3	78.10 ± 2.58	16.1 ± 1.7

Statistical Analyses

A two-way analysis of covariance (ANCOVA) with repeated measures was used to determine significant differences between or within the groups during the 10 d of supplementation with initial differences between groups serving as a covariate.

Significant main effects or interactions were further analyzed using a Tukey's *post hoc* test. The α-level for significance was set at 0.05.

Results

Figure 1.

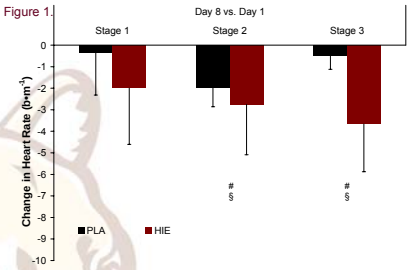
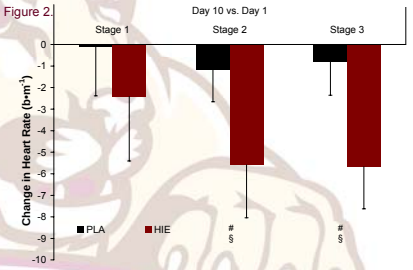


Figure 2.



Figures 1 & 2. Change in heart rate during three 5 min submaximal treadmill exercise bouts at 0% (Stage 1), 3% (Stage 2), and 6% (Stage 3) grade at 6 mph on Days 1, 8 and 10 of 10 days of Hyperimmune Egg protein or Placebo supplementation (mean ± SE). #, denotes HIE significantly different (P<0.05) from PLA. §, denotes HIE significantly different (P<0.05) from Day 1.

Figure 3.

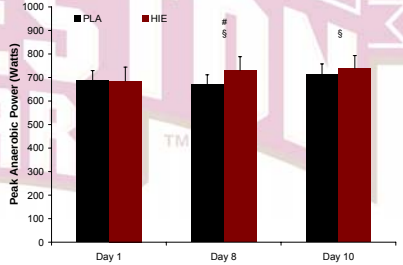


Figure 3. Peak anaerobic power from a 30 sec Wingate test on Days 1, 8 and 10 of 10 days of Hyperimmune Egg protein or Placebo supplementation (mean ± SE). #, denotes HIE significantly different (P<0.05) from PLA. §, denotes HIE significantly different (P<0.05) from Day 1.

Discussion

The supplement dosing was titrated over 5 days in an effort to prevent previously reported gastrointestinal disturbances. No subjects in PLA and only one subject in HIE reported any signs or symptoms of gastrointestinal disturbance and no subjects in either group reported any other changes in health status during their 10 d study period.

Supplementation with hyperimmune egg protein resulted in significant (P<0.05) decreases in heart rate between HIE and PLA during Stages 2 (6 mph @ 3% grade) and 3 (6 mph @ 6% grade) of the submaximal aerobic treadmill tests on Day 8 and Day 10. A significant decrease in submaximal HR allowed the subjects to perform the same amount of work at a lower intensity.

Interestingly, the subjects supplementing with hyperimmune egg protein showed a greater recovery capacity observed by an even greater decrease in submaximal HR following 48 hours recovery.

Similarly, hyperimmune egg protein supplementation resulted in significant (P<0.05) increases in peak anaerobic power between HIE and PLA on Days 8 and 10. The significant increase in anaerobic power indicates that individuals consuming hyperimmune egg protein can produce significantly more power within just eight days of supplementation as well as produce similar amounts of power after 48 hours indicating improved recovery.

Conclusions

The data suggest that oral supplementation of hyperimmune egg for 10 d resulted in significantly lower aerobic intensity, greater anaerobic power production, and enhanced recovery. However, the prospective mechanisms related to the increase in submaximal work efficiency and greater power production in response to hyperimmune egg supplementation remain to be identified.

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