Increased Muscular Strength and Enhanced Muscle Repair with Hyperimmune Egg Protein Supplementation

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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 muscular strength and/or enhanced recovery from previous exercise. METHODS: With the use of a double-blind, balanced, matched-pairs study design 24 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 1RMs of supine bench press and back squat followed by maximal reps at 70% of the respective 1RM for each exercise. Muscle soreness was assessed 24-h after 1RM testing by the subject placing a mark on a 10 cm visual analog scale (0 = No Soreness, 10 = Extreme Soreness) after performing one unloaded push-up and back squat, respectively. A repeated measures ANCOVA with initial differences between groups serving as a covariate was used to determine significant main effects. Significant main effects were further explored using Tukey's HSD post-hoc test. Significance was set at P < 0.05. RESULTS: Change in muscle soreness for the chest observed on Day 2 was significantly lower (p<0.05) between HIE and PLA vs. Day 1 (ΔHIE 55 ± 23%, ΔPLA 183 ± 54%). Change in muscular strength was significantly greater (p<0.05) between HIE and PLA on Day 8 (ΔHIE 2.8 ± 0.8 kg, ΔPLA 0.4 ± 0.6 kg) and Day 10 (ΔHIE 2.8 ± 0.8 kg, ΔPLA 0.6 ± 0.4 kg) versus Day 1. Change in muscular endurance was significantly greater (p<0.05) between HIE and PLA on Day 10 (ΔHIE 2 ± 1 reps, ΔPLA -1 ± 1 reps) versus Day 1 and Day 8 (ΔHIE 1 ± 1 reps, ΔPLA -2 ± 1 reps). CONCLUSIONS: These data suggest that oral supplementation of HIE for 10 d resulted in a significant increase in bench press strength and endurance, decreased muscle soreness, and enhanced muscle repair during recovery. However, the prospective mechanisms related to these performance enhancements, in response to HIE supplementation, remain to be identified. PRACTICAL APPLICATION: The data from this study indicate that hyperimmune egg protein is an effective protein-based supplement for increasing muscular strength and muscular endurance while minimizing muscular soreness apparently through enhancing muscle repair during the recovery process. Effects of long term utilization need 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 muscular strength and/or muscular endurance.

Purpose

The purpose of this investigation was to determine whether 10 d of oral Hyperimmune egg supplementation altered maximal strength, muscular endurance or enhanced recovery from previous exercise.

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 one repetition maximum (1RM) testing using the flat bench press and parallel back squat.

Each participant subsequently performed as many repetitions as possible using 70% of their own 1RM for the flat bench press and parallel back squat.

Muscle soreness was assessed on days 1, 8 and 10 prior to performance assessments and 24 hours later on days 2, 9 and 11. Subjects performed a flat bench press and parallel back squat with an unload bar and recorded their perceived muscle soreness on a 10 cm Visual Analog Scale (VAS: 1 = No Pain, 10 = Extreme Pain).

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.

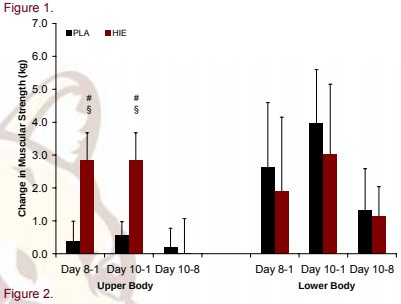
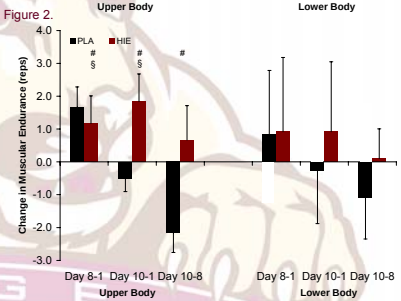


Figure 2.



Figures 1 & 2. Change in muscular strength (Figure 1) and muscular endurance (Figure 2) on Days 8 and 10, versus Day 1, and between Days 8 and 10, during 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.

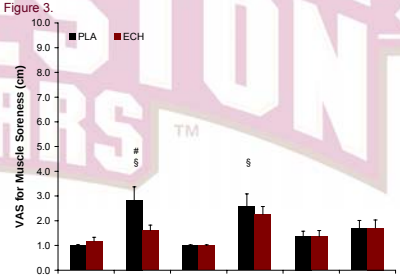


Figure 3. Muscle soreness via Visual Analog Scale on Days 1, 2, 8, 9, 10 and 11 during and following 10 days of Hyperimmune Egg protein or Placebo supplementation (mean ± SE). #, denotes HIE significantly different (P<0.05) from PLA. §, denotes HIE significantly different (P<0.05) from Day 1.

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) increase in upper body, but not lower body, muscular strength (1RM) between HIE and PLA on Day 8 and Day 10, as well HIE group had a significant increase in bench press 1RM on Days 8 and 10 as compared to Day 1.

Similarly, hyperimmune egg protein supplementation resulted in significant (P<0.05) increases in upper body muscular endurance between HIE and PLA on Days 8 and 10 as well as significantly less muscle soreness 24 hours following exercise.

As hypothesized, the subjects supplementing with hyperimmune egg protein showed a greater recovery capacity 48 hours after previous exercise.

Conclusion

The data suggest that oral supplementation of hyperimmune egg for 10 d resulted in a significant increase in bench press strength and endurance, decreased muscle soreness, and enhanced muscle repair during recovery. However, the prospective mechanisms related to these performance enhancements, in response to HIE supplementation, remain to be identified.

Practical Application

The data from this study indicate that hyperimmune egg protein is an effective protein-based supplement for increasing muscular strength and muscular endurance while minimizing muscular soreness apparently through enhancing muscle repair during the recovery process. Effects of long term utilization need to be identified.

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