

The Potential of Omega-3 Supplementation to Reduce Muscle Inflammation after Muscle-Damaging Exercise

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Abstract

Muscle Damaging exercise (EIMD) induces inflammation and relates to strength loss, muscle-soreness and impaired recovery. Overall, this means a performance impairment which might be relevant for those who engages in competitions or strenuous physical activities. It remains unclear whether Omega-3 fatty acids (O-3) supplementation blunts the exercise-induced inflammation associated with EIMD and therefore prevents performance impairment.

PURPOSE: Following a three-week supplementation with O-3, indirect markers of muscle damage were examined after a bout of EIMD to determine if supplementation had any beneficial effect in maintaining leg-strength levels.

METHODS: Eight healthy, recreationally active caucasian males (28.13 ± 3.4 yr) were randomly allocated to a supplementation group (SUP, n = 4) to receive 2.85g/day O-3 supplementation or a control group (CON, n = 4) for three weeks. Following supplementation, participants performed a bout of EIMD, which consisted of performing 10 sets of 15 repetitions of leg extension at a self-assessed intensity of 7/10 on the Rate of Perceived Exertion scale. Creatine Kinase (CK) from venous blood samples, isometric right-leg strength, squat-jump test and perceived soreness were determined, as indirect markers of muscle-damage at Baseline, immediately after EIMD (POST) and 48 hours after EIMD to coincide with the delayed muscle inflammatory response.

RESULTS: No statistically significant differences were found between Baseline and POST. There was a trend for smaller increase of CK levels (pre vs 48-h post EIMD) on the SUP group (38.8% increase) compared with the CON group (105.6% increase; P = 0.051). There was no significant effect (baseline vs. 48-h post EIMD) on muscle strength between SUP and CON group (P > 0.05), however, CON showed a larger decrease in strength compared to SUP (> 6.3% vs SUP). No differences in jump height were found between SUP and CON (P > 0.05). There was no significant difference in muscle soreness at 48-h post EIMD between SUP and CON group (P = 0.171).

CONCLUSION: Three weeks of O-3 supplementation might decrease exercise-induced muscle inflammation after eccentric exercise. The lack of statistical significance may be added to the limitations of the study design and sample size. Supplementation with O-3 can be beneficial in athletes undergoing heavy exercise regimes and in sedentary individuals re-starting physical activity, decreasing the exercise related muscle inflammation. The encouraging results from this pilot study have led to designing further work related to this topic.

Introduction

- Muscle inflammation which follows Exercise-Induced Muscle Damage (EIMD) relates to strength loss, muscle-soreness and impaired recovery [4].
- This affects athletes, those who engage in vigorous physical activity [2] and elderly people who suffer of chronic inflammation [3].
- It remains unclear whether Omega-3 fatty acids (O-3) supplementation blunts the exercise-induced inflammation associated with EIMD. Decreased levels of inflammation can result in increased performance and reduced recovery periods.

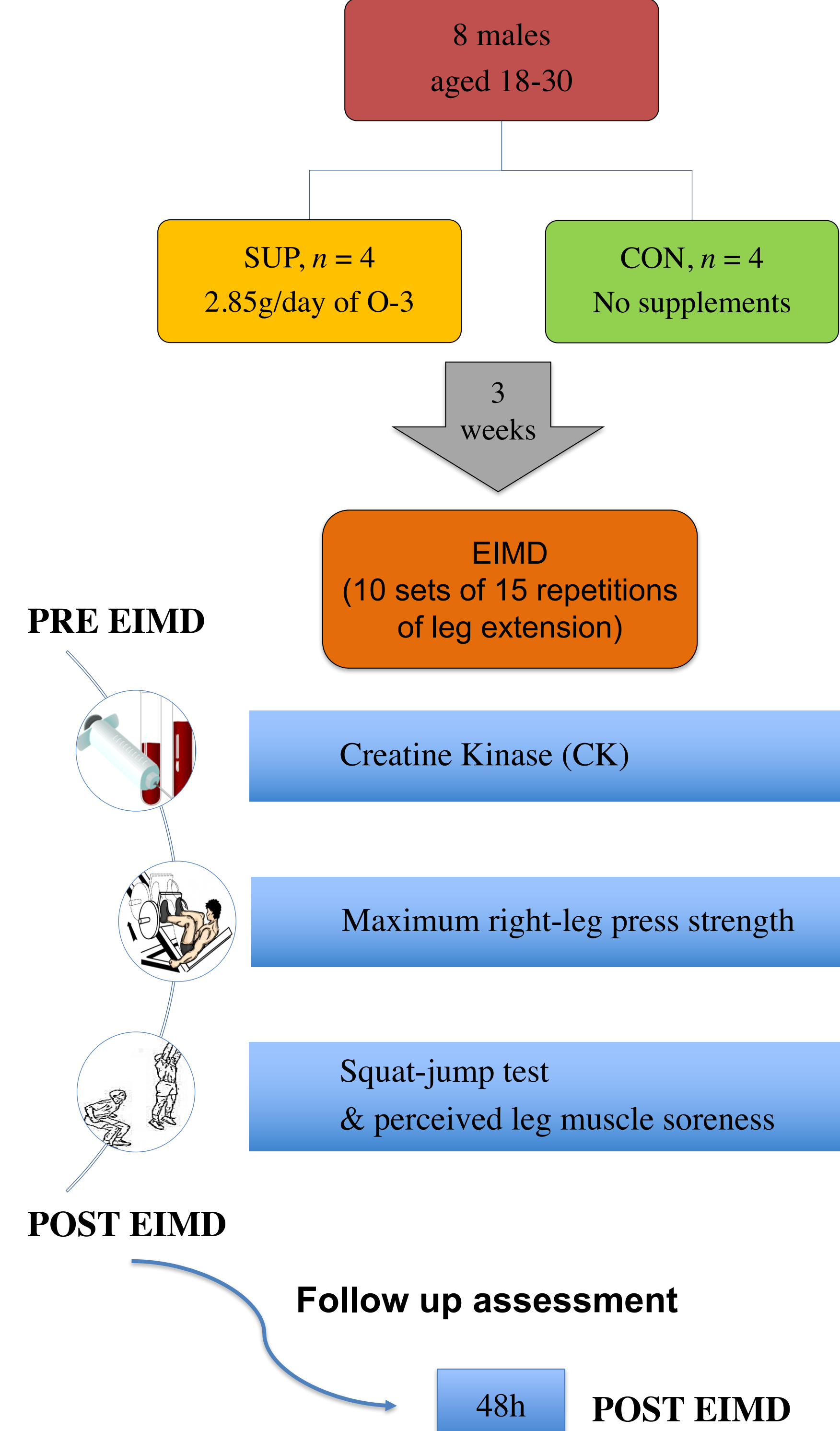
Aim

The aim is to determine if O-3 supplementation can maintain performance and improve recovery time by reducing muscle inflammation following exercise as assessed by plasmatic and indirect markers.

Objectives

- Assess the effect of 2.85g of O-3 supplementation in muscle inflammation in active individuals
- Design nutrition strategy to minimize post- exercise muscle soreness and attenuate force loss

Methods



Results

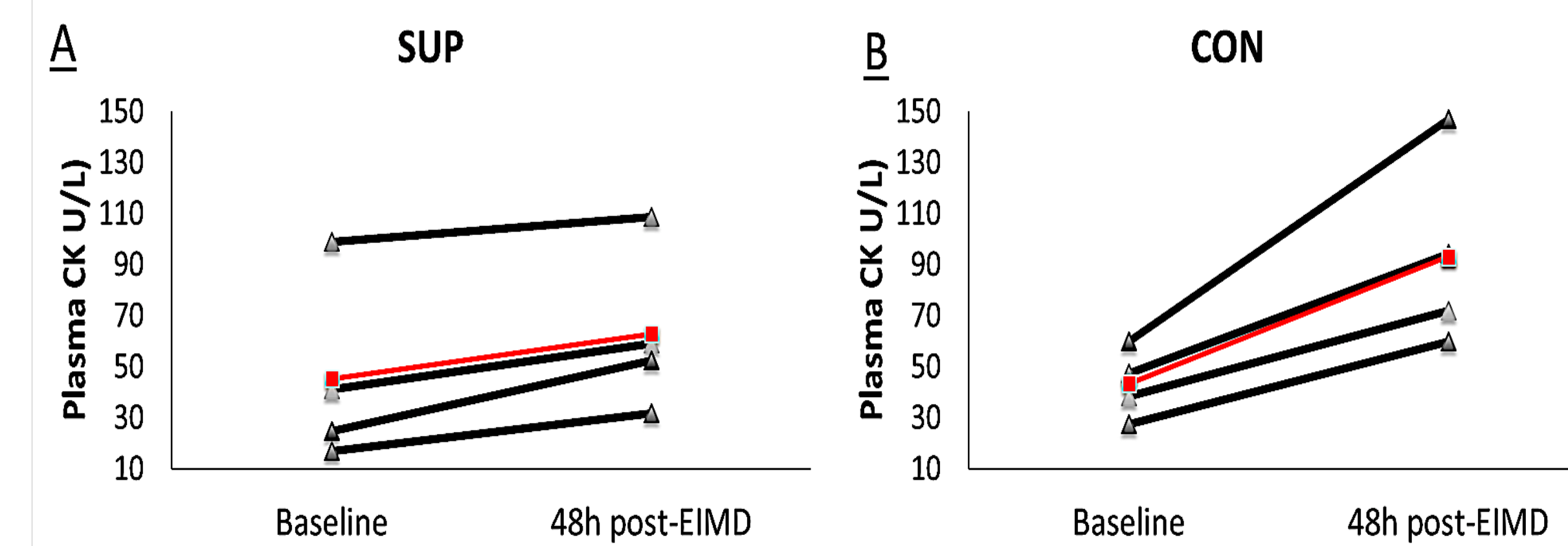


Figure 1. Circulating plasma CK assessed at baseline and 48h after an eccentric muscle-damaging protocol in the SUP group (38.8% increase) and in the CON group (105.6% increase; P=0.051). Individual responses are shown, with mean value presented as a red line.

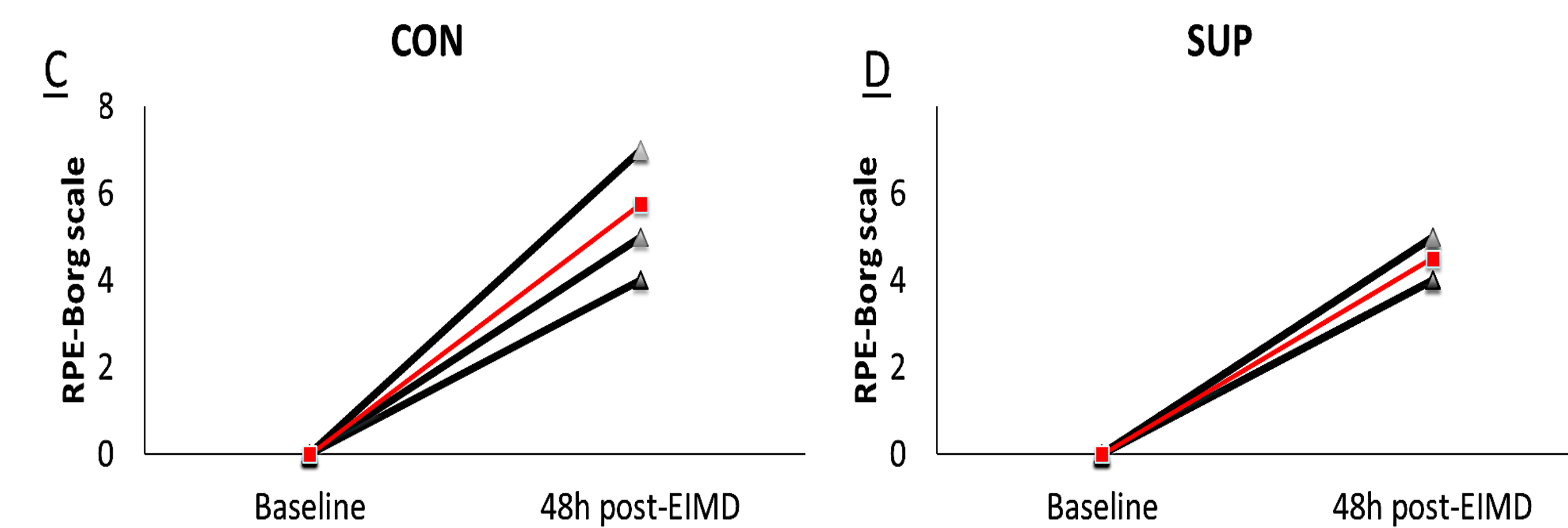


Figure 2. Perceived muscle soreness assessed at baseline and 48h after an eccentric muscle-damaging protocol in the CON group (5.75 ± 0.56) and in the SUP group (4.5 ± 0.56; P=0.171). Individual responses are shown, with mean value presented as a red line.

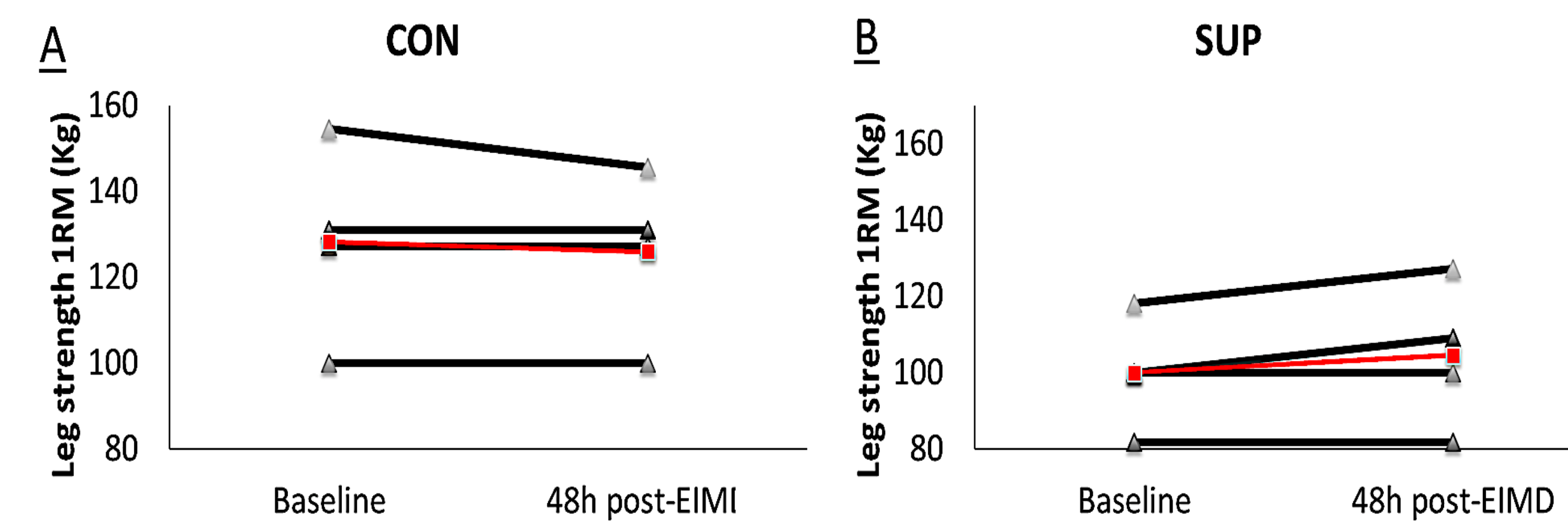


Figure 3. 1RM right-leg press assessed at baseline and 48h after an eccentric muscle-damaging protocol. CON showed a larger decrease in strength compared to SUP (>6.3% vs SUP; P>0.05). Individual responses are shown, with mean value presented as a red line.

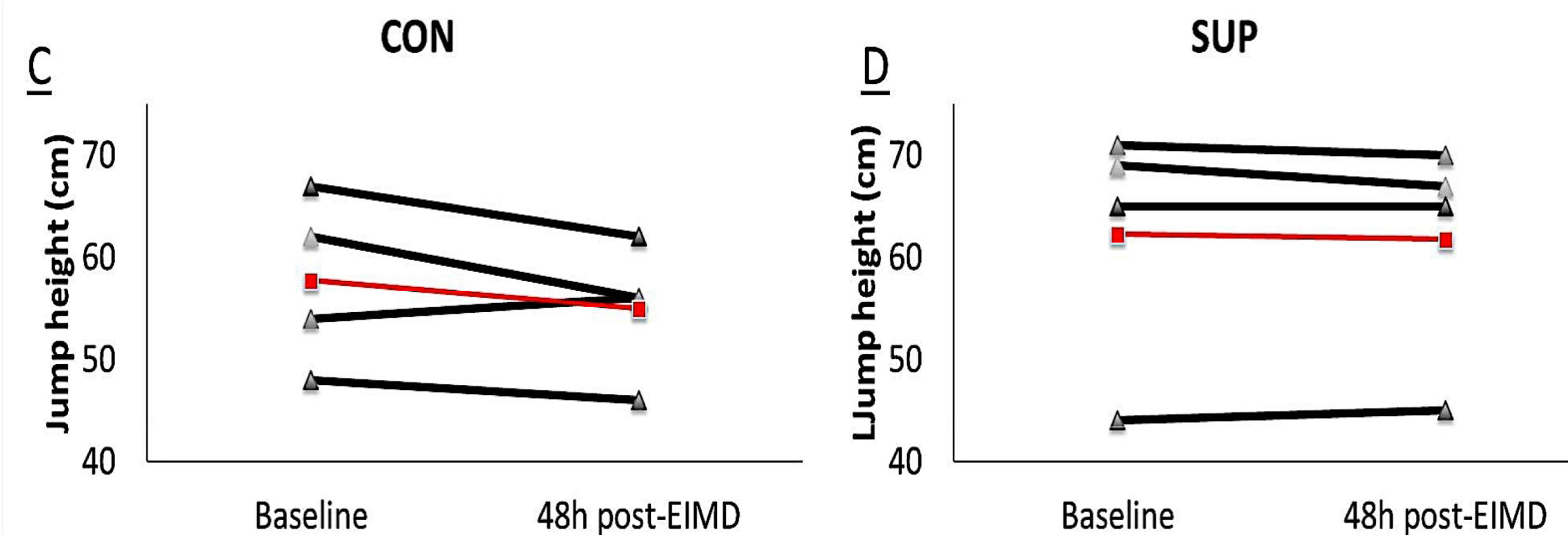


Figure 4. Squat-jump test assessed at baseline and 48h after an eccentric muscle-damaging protocol. There was a trend for the CON group to decrease their jump height more as compared to the SUP group (P > 0.05). Individual responses are shown, with mean value presented as a red line.

Conclusions

- Three weeks of O-3 supplementation might attenuate exercise-induced inflammatory response following EIMD as showed by the blunted decrease in strength and CK plasmatic concentration.
- Supplementation with O-3 could be beneficial to athletes undergoing heavy exercise regimes and to sedentary individuals re-starting physical activity. Decreased exercise-induced muscle inflammation can subsequently reduce the between-training sessions recovery time. As result, an increased volume of training can be performed with potential effects on performance.
- Further studies on the effects of O-3 supplementation upon muscle inflammation could provide insights for novel nutritional strategies to minimize post-exercise muscle soreness and the consequent decrease in performance.

Future work

- A bigger sample size may be required.
- Other inflammatory markers, such as IL-4, IL-6 and IL-10 could be of interest.
- Additional measurements should be done at 24h, 48h and 72h post EIMD.

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