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ORIGINAL ARTICLE

Twelve hours of a compression sleeve is not enough to improve the muscle recovery of an exercise-damaged upper arm

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KEYWORDS
Muscle damage;
Eccentric contraction;
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Abstract
Objective: To assess the efficacy of a compression sleeve worn for a short-time period (12 h) on the recovery from the symptoms of exercise-induced upper arm muscle damage.
Methods: A randomized controlled study was conducted on thirteen healthy young men using a standardized and exercise-induced upper arm muscle damage protocol, and they were immediately placed into two groups: TREATED ($n = 7$) and CONTROL ($n = 6$). Isometric elbow flexion strength, upper arm circumference, and muscle soreness measurements were taken before and at 24, 48, 72 and 96 h after the damaging exercise, and were used as criteria of exercise-induced muscle damage. Group comparisons were made for each variable using a two-way ANOVA design (2 groups $\times$ 5 measurements), and with a significance level of $P < 0.05$.
Results: A significant impairment ($P < 0.001$) was observed in muscle strength ($\sim$43% and $\sim$34%, for CONTROL and TREATED groups, respectively, 24 h after exercise), as well as a significant increase ($P < 0.001$) in upper arm circumference (UAC) and muscle soreness ($F_{4,55} = 6.49$ for UAC and $F_{4,55} = 6.95$ for muscle soreness) among the measurements after exercise for both groups, with no significant differences between them.
Conclusions: These results, together with previous findings, suggest that the use of a compression garment for 12 h is not enough to improve the recovery from exercise-induced muscle damage in the upper arm, and longer periods of compression may be necessary to achieve positive outcomes.

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PALABRAS CLAVE
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Rehabilitación

El uso de manga de compresión durante 12 horas no es suficiente para mejorar la recuperación muscular del brazo tras el daño inducido por el ejercicio

Resumen
Objetivo: Evaluar la eficacia de la manga de compresión usada durante un período de tiempo corto (12 h) en la recuperación de los síntomas de daño muscular inducido por el ejercicio de los músculos del brazo.
Métodos: En un estudio aleatorizado controlado, 13 hombres jóvenes sanos realizaron un protocolo de ejercicio estandarizado para inducir daño muscular para los flexores del codo y se dividieron inmediatamente en 2 grupos: tratados ($n = 7$) y control ($n = 6$). Se tomaron medidas de la fuerza isométrica de flexión del codo, la circunferencia del brazo (CB) y la percepción del dolor muscular antes y 24, 48, 72 y 96 h después del ejercicio, y se utilizaron como criterios de daño muscular inducido por el ejercicio. Comparaciones entre grupos se hicieron para cada variable con un ANOVA de 2 vías (2 grupos $\times$ 5 medidas) y con un nivel de significación de $p < 0,05$.
Resultados: Se observó una reducción significativa ($p < 0,001$) de la fuerza muscular ($\sim$43% y $\sim$34% para el grupo control y tratados, respectivamente, 24 h después del ejercicio) y un aumento significativo ($p < 0,001$) en la circunferencia del brazo y dolor muscular ($F_{4,55} = 6,49$ para CB y $F_{4,55} = 6,95$ para dolor muscular) a lo largo de las medidas después del ejercicio en ambos grupos, sin diferencias significativas entre ellos.
Conclusiones: Nuestros resultados, junto con los hallazgos previos, sugieren que el uso de la manga de compresión durante 12 h no es suficiente para mejorar la recuperación de los síntomas de daño muscular inducido por el ejercicio de los músculos del brazo, y para lograr resultados positivos son necesarios largos períodos de compresión.

Introduction

Exercise-induced muscle damage (EIMD) after eccentric contractions is a well described condition, which is clinically marked by functional impairments, such as decreased maximal force production capacity, changes in force production optimal length, increased passive tension, and muscle edema.[1–3] These changes may lead to limitation of athletic performance[4,5] and increased risk of injury.[6]

The muscle function recovery after damage events is a relevant issue and has attracted attention of many researchers, physical therapists and athletic coaches. Aiming to fostering muscle recovery, contrast water therapy, cryotherapy with ice bags or cold water immersion, low intensity active exercise, phototherapy, massage and compression garment are some recovery strategies employed.[5,7–12]

The use of compressive garments to improve the muscle recovery has shown promising results.[10,12,13] There are evidences that this treatment modality may promote a more rapid recovery of muscle function, and reduced post-exercise muscle soreness and swelling,[12,14] with potential benefits mediated via physical, physiological or psychological effects, although underlying mechanisms are not well elucidated.[14]

Despite the promising results, it should be noted that the large majority of studies where the compressive garments are employed involve lower limb. In a recent meta-analysis, Hill et al.[12] listed twelve studies that achieved established criteria and only three of them[13,15,16] included the use of compression sleeve worn after damage exercises of upper arm. Interestingly, in these studies the compression sleeve was worn for 72 or 120 h following damaging exercise, while there are studies reporting effective results wearing compression stockings by only 12 h following lower limb damaging exercises.[9,10,17]

It is important to note that the post-exercise recovery strategies should not only be effective, but also promote treatment adhesion, which involves the treatment time necessary to achieve effective results. Notwithstanding, treatment periods of 72 h or more seem to be long, while treatments for short periods, as 12 h, may improve the treatment adhesion, but, to our knowledge, there are no studies that have investigated the efficacy of compression sleeve worn for short-time periods, as 12 h, on recovery from the symptoms of EIMD from upper arm muscles. This issue gains relevance because upper body exercise results in greater levels of muscle damage and soreness than lower body exercise.[18–20] Then, it is possible to hypothesize that the use of compression sleeves by short-time periods may not be sufficient to promote an effective recovery as observed when compression garments are applied for lower-body.

Therefore, this study was carried out to assess the efficacy of compression sleeve worn for short-time periods (12 h), on recovery from the symptoms of EIMD from upper arm muscles.