Journal of Bodywork & Movement Therapies (2015) 19, 458–463

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/jbmt

PILOT STUDY

Effect of massage on DOMS in ultramarathon runners: A pilot study

Lorenzo Visconti, PT-OMT [a,*], Gianpiero Capra, PT [c], Giacomo Carta, PT [b], Corrado Forni, PT [d], Denise Janin, PT [a]

[a] *Studi Fisioterapici di Montagna, Italy*
[b] *Istituti Clinici di Perfezionamento di Milano, Italy*
[c] *SUPSI Scuola Universitaria per la Svizzera Italiana, Lugano, Switzerland*
[d] *Università del Piemonte Orientale, Novara, Italy*

Received 10 May 2014; received in revised form 30 October 2014; accepted 11 November 2014

KEYWORDS
Massage;
DOMS;
Ultramarathons

Summary In recent years, the popularity of ultramarathons has increased. During these competitions, musculoskeletal problems are very common. Among the more frequent of those problems is the onset of muscle pain, which is defined in the literature as delayed-onset muscle soreness (DOMS).

The present study aimed to collect epidemiological data regarding the onset of musculoskeletal problems during the Tor des Geants (International ultramarathon race of 330 km in length and 24,000 m in elevation difference) and to describe the effects of massage on reducing pain and overall perceived improvement in a sample of 25 athletes who complained of DOMS. Two hundred and twenty-one treatments were performed on 220 ultramarathon runners, of which 207 were males and 34 were females; the age group most represented ranged from 40 to 50 years. The most common symptom was pain, which occurred in more than 95% of cases, and the most affected area was the lower extremities (90% of subjects). In the analysed subjects, treatment with massage generated a significant ($p < 0.0001$) improvement. The numeric pain rating scale (NPRS) value was 3.6 points on average (SD 2.1) after massage, and there were no cases of worsening DOMS after massage as determined using the patient global impression of change (PGIC). The values of minimal clinically important difference (MCID) in DOMS management were calculated on the basis of the ROC curves and two other anchor-based methods in the PGIC and were 2.8–3.9 points on the NPRS. In the context analysed, massage was an effective treatment to reduce DOMS during the onset of symptoms.

* Corresponding author. Rue Palleusieux 1-11010, Pré-Sain-Didier, Aosta, Italy. Tel.: +39 3485642139; fax: +39 0165867201.
E-mail address: loppiski@gmail.com (L. Visconti).

http://dx.doi.org/10.1016/j.jbmt.2014.11.008
1360-8592/

Introduction

Ultramarathons, which are race events involving athletes running for distances longer than that of a traditional marathon (42,195 km in length) (Knechtle, 2012), are increasing in popularity. During ultramarathons, athletes commonly experience different types of musculoskeletal problems (Khodaee and Ansari, 2012); the most frequent problem of which is delayed onset muscle soreness, DOMS (Frey et al., 1994). DOMS is typically induced by eccentric exercise, (Armstrong RB 1984; Zainuddin et al., 2005a,b) but its onset does not necessarily indicate muscle damage (Nosaka et al., 2002 Yu et al., 2013). This phenomenon is related to a pronounced systemic inflammatory response and a generalised immune response by the body (Pedersen et al., 1998 Paulsen et al., 2012). DOMS is disabling for ultramarathon runners, particularly when it occurs in the lower limbs, which result in pain and loss of maximal contraction strength. The literature has described different types of treatments for DOMS. The use of anti-inflammatory drugs and central analgesics and immobilisation for the management of DOMS does not appear to alleviate much of the symptoms (Frey et al., 1994 Loram et al., 2005 Nieman et al., 2006 Zainuddin et al., 2005a,b).

This study collected epidemiological data regarding the onset of musculoskeletal problems during ultramarathons and described the effects of massage on DOMS in a real context.

Materials and methods

Subjects for this study were recruited halfway through the *Tor des Géants*, an endurance trail race of 330 km in length and 24,000 m in elevation difference in Aosta Valley, in the Northwest Alps in Italy.

Data were acquired through a database that was specifically tailored for physiotherapists. Patients signed an informed consent for treatment and to participate in the scientific study prior to the start of the race. Subjects described their medical history and were evaluated by a graduated physical therapist experienced in manual therapy to rule out any contraindications to treatment. The treatments were administered by students near the end of their bachelor studies in physiotherapy trained the day before on the techniques to be used in that context, which consisted of massage therapy, taping, mobilisation and counselling.

A 20-min massage therapy treatment in the area that the subjects were complaining of symptoms was performed. In a review of the effects of massage on DOMS, Nelson (2013) described how difficult it was to precisely reproduce the techniques, pressure, etc. from massage session to session); however, the instructions given to the students were to perform an *effleurage* without causing pain in the entire limb with a particular emphasis in the areas reported to be very symptomatic. The patient was in the optimal position for treatment of muscles of the posterior compartment (hamstrings and triceps surae) and was placed in the supine position for treatment of muscles of the anterior compartment of the limb (quadriceps and foot dorsiflexors).

A neutral cream was used to perform the massage.

To determine the degree of perceived pain before and after treatment, the *numeric pain rating scale* (NPRS) was administered. The *Patient Global Impression of Change scale* (PGIC), which has been used in previous studies on massage effect (Ferreira-Valente and Pais-Ribeiro, 2011; Jensen et al., 1999; Wang and Keck, 2004; Boulanger et al., 2012) to measure the degree of subjective perceived improvement at post-treatment (Guy, 1976), was used in this study. The PGIC has also been used to determine the correlations between the clinically important differences and the NPRS (Farrar et al., 2001). Furthermore, global assessment scales have been proven to be sensitive to changes in both a positive and negative manner.

The operators who administered the evaluation questionnaires were not the same operators who performed the treatments.

Because the treated ultramarathon runners were participating in the race, we used scales and measures that did not require a great amount of the athletes' time.

The effect of the massage was assessed by comparing the difference in values of the minimum clinically important difference (MCID) with those identified by Cella et al. (2002) and Dworkin et al. (2008).

The treatments were performed in a gym. An area of the gym was dedicated to the physiotherapy treatments, another area was devoted to eating, and another area was dedicated to sleeping for the athletes. The questionnaires were administered to the athletes who had previous physiotherapy treatment while they were eating.

Data analysis

Because there were no systematic reviews or clinical studies that identified the minimal clinically important difference (MCID) value in the treatment of DOMS in ultramarathon runners, this factor was calculated from the collected data as suggested by Revicki et al., 2008. The three criteria suggested by Copay and colleagues when calculating the MCID were considered (Copay et al., 2007).

The NPRS scale values were compared before and after treatment and were categorised according to the PGIC questionnaire score in order to locate the value of the clinical significance of the treatment performed, and the NPRS scale values were compared using Student *t*-test. The correlation coefficients (P) were calculated using the Pearson correlation test. The Spearman correlation index was calculated for the values obtained from the NPRS and PGIC scale at pre- and post-treatment.

A receiver operating characteristic (ROC) curve analysis was performed to assess the accuracy of the PGIC in predicting changes in the NPRS and as a method for calculating the MCID value for the NPRS (Metz, 1978; Metz 2006, Florkowski, 2008; Copay et al., 2007; Wright et al., 2012). Analysis of the data was performed using statistical software (SPSS version 20.0, SPSS Inc., Chicago, IL). The statistical significance was established at a value of $\alpha = 0.05$. The data were presented as an average of the NPRS values or as specified otherwise.