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Research

# Massage therapy decreases pain and perceived fatigue after long-distance Ironman triathlon: a randomised trial

Guilherme S Nunes [a], Paula Urio Bender [a], Fábio Sprada de Menezes [b], Igor Yamashitafuji [a], Valentine Zimermann Vargas [a,c], Bruna Wageck [a]

[a] Department of Physiotherapy, Center of Health and Sport Sciences, Santa Catarina State University, Florianópolis; [b] Department of Physiotherapy, Estácio University Center of Santa Catarina, São José, Brazil; [c] Department of Physiology, São Paulo Federal University, São Paulo, Brazil

KEY WORDS

Musculoskeletal manipulations
Musculoskeletal pain
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Fatigue

ABSTRACT

**Question:** Can massage therapy reduce pain and perceived fatigue in the quadriceps of athletes after a long-distance triathlon race (Ironman)? **Design:** Randomised, controlled trial with concealed allocation, intention-to-treat analysis and blinded outcome assessors. **Participants:** Seventy-four triathlon athletes who completed an entire Ironman triathlon race and whose main complaint was pain in the anterior portion of the thigh. **Intervention:** The experimental group received massage to the quadriceps, which was aimed at recovery after competition, and the control group rested in sitting. **Outcome measures:** The outcomes were pain and perceived fatigue, which were reported using a visual analogue scale, and pressure pain threshold at three points over the quadriceps muscle, which was assessed using digital pressure algometry. **Results:** The experimental group had significantly lower scores than the control group on the visual analogue scale for pain (MD –7 mm, 95% CI –13 to –1) and for perceived fatigue (MD –15 mm, 95% CI –21 to –9). There were no significant between-group differences for the pressure pain threshold at any of the assessment points. **Conclusion:** Massage therapy was more effective than no intervention on the post-race recovery from pain and perceived fatigue in long-distance triathlon athletes. **Trial registration:** Brazilian Registry of Clinical Trials, RBR-4n2sxr. **[Nunes GS, Bender PU, de Menezes FS, Yamashitafuji I, Vargas VZ, Wageck B (2016) Massage therapy decreases pain and perceived fatigue after long-distance Ironman triathlon: a randomised trial. *Journal of Physiotherapy* 62: 83–87]**



## Introduction

Ironman is one of the main long-distance triathlon races in the world. About 40 Ironman events take place every year across the globe, with around 2000 athletes participating in each event.[1] In this competition, athletes have to cover a distance of 226 km, which consists of swimming 3.8 km, cycling 180 km and running 42.2 km.[2] It is a strenuous competition that requires high energy expenditure and generates high physical and metabolic stress.[3,4] Because of this stress, Ironman athletes often experience various medical conditions such as dehydration, heat stroke, hyponatraemia, musculoskeletal injuries, hypothermia, skin injuries, fever, hypoglycaemia, diarrhoea and vomiting.[4–7] However, the most common symptoms after a race are pain and muscle fatigue, which are probably caused by muscle damage that induces an inflammatory response and a reduction in energy reserves.[4,8–10] The body parts most affected by pain and fatigue due to constant overload are the lower limbs, mainly around the knees.[11,12]

Therapeutic interventions are used to try to minimise the severity of symptoms in triathletes after strenuous competition, such as massage, cryotherapy and stretching.[13–15] Massage therapy is often used after competitions and is defined as a mechanical manipulation of human body tissue by means of manual compressions and rhythmic percussions.[13,14] Different massage therapy techniques are expected to increase blood and lymphatic flow;[14] theoretically, this might accelerate the elimination of catabolites, which possibly reduces the sensation of fatigue.[14] Another expected effect of massage therapy is pain relief.[14] The mechanical stimulus caused by manual contact on the skin may have a neurological effect, blocking the noxious stimuli based on the gate-control theory.[14] Another possibility is a physiologic effect via the release of β-endorphins.[14]

Several clinical trials have demonstrated the beneficial effects of massage therapy in athletes after strenuous exercises.[16,17] Ogai et al[17] evaluated physically active university students who performed the same protocol through strenuous workout on a stationary bike in two sessions. In one of the sessions, they received massage to the lower limbs for 10 minutes in the middle of the protocol. After the massage protocol session, the participants showed a decrease in muscle stiffness and perceived fatigue, which was evaluated by the visual analogue scale (VAS).[17] Mancinelli et al[16] also verified the effects of massage in athletes. In this study, high school basketball and volleyball players were divided into two groups after the first training session of the season: one group

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rested while the other received massage to the quadriceps muscle on the peak day of delayed onset muscle soreness.[16] The group that received massage showed a decrease in perceived pain and pressure pain threshold and improved vertical jump performance.[16]

Some systematic reviews have been performed to investigate the effects of massage therapy.[13,18] These reviews have concluded that massage therapy can have benefits in a variety of musculoskeletal conditions,[18] including soreness after strenuous exercise.[13] However, among the included studies, there has been some lack of standardisation of the techniques applied during the massage therapy. Furthermore, the intense physical activities used in these studies were generally high-intensity exercise regimens designed to bring on rapid fatigue. The studies were also not conducted in real competition situations, and the massage intervention was not always administered immediately after the exercise. Therefore, questions remain regarding the effectiveness of massage after very prolonged, strenuous sporting competitions such as long-distance triathlon.[13]

Therefore, the research question for this randomised, controlled trial was:

Does massage reduce pain and fatigue in the quadriceps of athletes after a long-distance triathlon race (Ironman)?

## Method

### *Design*

This was a randomised clinical trial in which the participants were allocated to one of two groups: an experimental group or a control group. The experimental group received massage to the quadriceps, which was aimed at recovery after competition, and the control group rested in a sitting position. The randomisation was conducted using sealed and opaque envelopes to conceal each upcoming allocation during recruitment. A researcher who was not involved in the evaluations or interventions of this study prepared these envelopes. The study design is presented in Figure 1.

### *Participants, therapists and centre*

Seventy-four triathlon athletes from Ironman Brazil took part in this study. To be eligible for inclusion in the study, athletes had to complete the entire Ironman triathlon race and report to the physiotherapy clinic with their main complaint being pain in the anterior portion of the thigh. The exclusion criteria were any medical conditions that were not compatible with the procedures of the study, such as: severe metabolic and respiratory disorders during the study procedures, cramps during the evaluations and/or interventions, presence of abrasions on the thigh, or any change in sensation of the thigh caused by analgesics or cryotherapy.

The evaluations and interventions of this study were conducted in the physiotherapy clinic of the Ironman Brazil triathlon competition. This clinic was located near the finish line. First, the athletes were assessed to determine if they met the eligibility criteria, and data about their baseline characteristics were collected. The measurements were taken from the most painful quadriceps, as reported using the VAS. If the participant reported the same level of pain in both thighs, the side to be treated was randomly selected by flipping a coin. After the first evaluation, the participants were allocated to a group and directed to the intervention site. After the interventions, the same blind researcher reassessed the participants and, if needed, they were directed back to the clinic to continue the treatment. To maintain the assessor blinding, the evaluation was conducted in a different place to where the massage intervention was conducted, the assessor was not informed of who was in which group and the foam used to reduce friction during the massage was also applied on the quadriceps of the control participants.

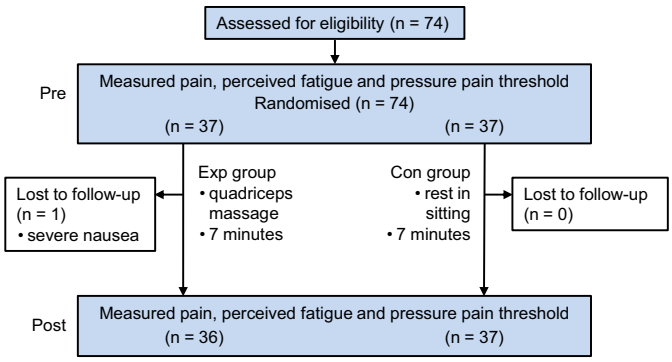


**Figure 1.** Design and flow of participants through the study.
Exp = experimental group, Con = control group.

### *Intervention*

The experimental group received massage for 7 minutes from a therapist who was not involved in the measurements. The intervention consisted of the following procedures: 1 minute of superficial effleurage, in which the therapist slid both hands in the direction of the muscle fibres from distal to proximal with a gentle pressure on the thigh; 2 minutes of deep effleurage, in which the therapist performed the same movement but applied more pressure to the thigh; 2 minutes of petrissage, in which the therapist used the entire surface of the palm of the hands to compress and lift the tissue sequentially; 1 minute of tapotement, in which the therapist agitated the tissues of the thigh with cupped hands; and 1 minute of superficial effleurage to finish the intervention. A video demonstration of the techniques is presented in Appendix 1 (see eAddenda for Appendix 1).

Massage therapy techniques.