

EFORT Abstract Submission

General Orthopaedics

Sports / knee soft-tissue

EFORT12-3384

Pulsed electromagnetic field therapy reduces delayed onset muscle soreness in marathon runners. A doubleblind randomized placebo-controlled study.

C. H. Rasmussen ¹, M.S. Rathleff, C. R. Knudsen ¹, S.T. Skou, M. G. Jørgensen ¹, J. L. Olesen ¹, V. Khalid ¹, S. Rasmussen ^{1,*}

¹Orthopaedic Surgery Research Unit , Research And Innovation Center, Aalborg Hospital, Aalborg, Denmark

INTRODUCTION: Delayed onset of thigh muscle soreness (DOMS) is frequent in marathon runners. Pulsed electromagnetic field therapy (PEMF) is reported to reduce pain in different indications. At EFORT 2011 we presented a pilot study indicating a possible effect on DOMS.

OBJECTIVES: The purpose of this study was [VK1] to investigate if PEMF can reduce DOMS in a larger cohort of marathon runners. Primary outcome was pain and secondary outcome was running activity

METHODS: The design of this study was a double blind, randomized placebo-controlled study covering a 5 days period after completion of a marathon race. Following 4 marathon races all runners that completed the 42.195 km were asked to participate in the study. A total of 439 runners were enrolled to 4 marathon races and were eligible, 94 were excluded and 133 marathon runners were randomly assigned to either PEMF or placebo therapy. The intervention group received an active pulsed electromagnetic field device, and the control group received a deactivated placebo device. Active and placebo devices were identical. Placebo devices were used in exactly the same manner as the active devices but produced no electromagnetic field into the tissue. The pulsed electromagnetic field device does not produce heat or cause any sensation in the tissue and thereby blinding the participants to treatment. The pulsed electromagnetic field signals were 2-msec burst of 27.12-MHz sinusoidal waves every second. Peak magnetic field was 0.05 G, which induced an average electric field of 10 mV / cm in the muscle with an effect of 7.3 mW / cm³. All subjects were told to use the device 20 minutes four times each day and place the device on the most painful area on the quadriceps. Pain intensity was evaluated three times a day with a Visual Analogue Scale (VAS) during a 90° squat with a self-administered questionnaire and described with area under curve (AUC). Running activity was registered.

RESULTS: Compliance was 70 %. In the active group 36 men and 10 women returned the questionnaire and in the placebo group 42 men and 5 women returned the questionnaire. There was no difference in demographics between the analysed active and placebo group. The areas under the curves of the two groups showed a significantly lower area under curve for the active therapy group compared to the placebo therapy group (P = 0.024). The VAS scores were significantly lower in the active therapy group at day 1 noon (P = 0.043), day 1 evening (P = 0.042) and day 2 evening (P = 0.028). Furthermore the active therapy group ran 61 (53-78) minutes 1 day after the marathon compared to 27 (18-36) minutes in the placebo therapy group (P = 0.017).

CONCLUSION: This study demonstrates that PEMF can reduce DOMS in marathon runners in the days following a marathon race. The increased running time in the active therapy group 1 day after the marathon race supports these findings.

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Disclosure of Interest: None Declared

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Congress 2012

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EFORT 2012: 7,000 orthopaedic specialists gather in Berlin

Electromagnetic field therapy reduces muscle soreness

Weak pulsed magnetic fields help strained muscles to recuperate more quickly. Researchers at the EFORT Congress showed that marathon runners can alleviate muscle soreness more quickly with this method and return earlier to their accustomed exercise routine.

Berlin, 24 May 2012 – Muscle soreness is one of the most common complaints of all in sports. Pulsed electromagnetic field therapy (PEMF) is an effective form of treatment according to a study presented by Danish researchers at the 13th Congress of the European Federation of National Associations of Orthopaedics and Traumatology (EFORT) in Berlin. In the method they tested, brief magnetic pulses are sent through the injured tissue, triggering currents and stimulating cell repair. “We were able to demonstrate that delayed muscle soreness in marathon runners can be reduced with pulsed electromagnetic field therapy,” the head of the study, Prof Dr Sten Rasmussen, noted. Prof Rasmussen is an orthopaedic surgeon at Aalborg Hospital in Aalborg, Denmark.

Deceleration creates mini-tears in muscles

Delayed muscle soreness is the form of pain that usually does not set in until hours after certain sets of muscles are subject to great exertion. It is caused by micro-tears in sarcomeres, the smallest functional units of muscle tissue. The tears are caused by the deceleration of a movement. Inflammations develop in the tears. Together with water, they form oedemas and cause the muscle to swell up. If waste products from these tears are transported twelve to 24 hours later and hit nerve cells, this leads to typical stretching pain.

Magnetic pulse triggers regeneration

Studies show that many of the widespread countermeasures such as stretching before and after workouts have scarcely any effect. Well-intended massaging even delays the healing instead of speeding it up. Heat treatment, for its part, does deliver positive results for pain relief and recuperation of the muscle fibres. In this first double-blind randomised placebo-controlled study of its kind, Danish researchers showed that pulsed electromagnetic field therapy has the potential to become established as a therapy for muscle soreness of the type that occurs after marathons, for example.

Study involving marathon runners

A group of 133 athletes participating in four marathon races were selected for the study. After a completed race, they were each given a pulsed electromagnetic field therapy (PEMF) device to take home with them. The pulsed electromagnetic field signals two 2-msec burst of 27.12-MHz sinusoidal waves every second. The peak magnetic field was 0.05 Gauss (G), which induced an average electric field in the muscle of 10 mV/cm with an effect of 7.3 mW/cm³. All subjects were told to use the device 20 minutes four times a day and place the device on the most painful area of their quadriceps.

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13th EFORT media&press 2012; press@efort.org; Ph.: [+41 78 688 59 21](tel:+41786885921),
Dr. Birgit Kofler, B&K Kommunikationsberatung; E-Mail: kofler@bkkommunikation.com;
Ph. Berlin: [+49 30 700159676](tel:+4930700159676), Ph. Vienna: [+43 1 3194378 13](tel:+431319437813); Mobile: [+43 676 6368930](tel:+436766368930)

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Evaluation during squats and running

What the subjects did not know was that every second device handed out was a placebo device with a deactivated electromagnetic field. The placebo group did not notice because the PEMF method is not accompanied by any sensation at all in the tissue. The researchers were thus able to determine the effectiveness of this application in comparison with the placebo group. This difference was checked three times a day during a 90° squat the subjects were supposed to perform and then graphically depict the intensity of their pain. In addition, the lengths of time they ran on days after the marathon were also recorded.

Faster healing of pain and longer runs

The therapy group with activated PEMF devices did in fact produce the better results. On the first and second day after the marathon, the intensity of pain for them was considerably lower than for the placebo group. The running times on the day after the marathon provided confirmation. With pulsed magnetic field therapy, the athletes managed to run an average of 61 minutes whereas those in the control group ran only 27 minutes, not even half as long.

About EFORT

The European Federation of National Associations of Orthopaedics and Traumatology, EFORT, is the umbrella organisation linking Europe's national orthopaedic societies. EFORT was founded in 1991 in the Italian Marentino. Today it has 42 national member societies from 43 member countries and six associate scientific members.

EFORT is a non-profit organisation. The participating societies aim at promoting the exchange of scientific knowledge and experience in the prevention and treatment of diseases and injuries of the musculoskeletal system. EFORT organises European Congresses, seminars, courses, forums and conferences. It also initiates and supports basic and clinical research.

Source: EFORT Abstract 3384: Pulsed electromagnetic field therapy reduces delayed onset muscle soreness in marathon runners. A double-blind randomized placebo-controlled study.

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13th EFORT media&press 2012; press@efort.org; Ph.: [+41 78 688 59 21](tel:+41786885921),
Dr. Birgit Kofler, B&K Kommunikationsberatung; E-Mail: kofler@bkkommunikation.com;
Ph. Berlin: [+49 30 700159676](tel:+4930700159676), Ph. Vienna: [+43 1 3194378 13](tel:+431319437813); Mobile: [+43 676 6368930](tel:+436766368930)