

## Background

Delayed onset muscle soreness (DOMS) is a common problem that almost everyone has experienced at one point or another. DOMS occurs most commonly about 24 - 48 hours after exercise. It is likely to occur after the person performs an exercise for which they are not properly conditioned. For example, when you suddenly go out and perform an exercise you haven't been training for, you may develop soreness the day after. Most theories for DOMS have focused on its being caused by structural damage in the connective tissue and muscle fibers along with inflammation and pain.

Various strategies have been used in an attempt to mitigate or alleviate DOMS. These include stretching, exercise, ultrasound, topical analgesics, and pharmacological agents. Massage has also been used and there are subjective reports that it helps to decrease DOMS. One reason may be the effects of massage on reducing post-exercise inflammation that is associated with DOMS.

The beneficial effects of any treatment in addressing DOMS should include not only decreases in the inflammatory activity, but also a decrease in the individual's perception of pain. This is important because a decrease in soreness is not measured only by a physiological response, but by the individual's perception of pain. The present study attempted to evaluate the effectiveness of massage in reducing characteristics of DOMS as well as the individuals' perception of lingering DOMS.

In this study hamstring soreness was mechanically induced with eccentric muscle contractions using an isokinetic testing device. Eccentric muscle contractions were used because they are known to more easily create DOMS than other types of muscle contraction. After a brief warm-up period, the subjects in the experiment completed six sets of 10 maximal eccentric contractions of the right hamstring muscle. At two hours post-exercise the subjects received either 20 minutes of massage or a 20 minute control treatment that did not involve massage. The massage technique consisted of five minutes of effleurage, one minute of tapotement, 12 minutes of petrissage, and two additional minutes of effleurage. The massage was performed by a senior physical therapy student. The timing was standardized by an audiotape that was playing during the massage.

The control group also heard the same audiotape, but there was no specific massage technique performed. The placebo treatment consisted of applying a lotion to the subject's leg and then the practitioner instructed the subject to rest for 20 minutes while listening to the same audiotape that the treatment group heard. Both groups were told that the treatment they received may reduce DOMS. After the treatment subjects completed a pain questionnaire and returned to the lab to be tested on various parameters at 6, 24, and 48 hours.

## Findings and Discussion

At 48 hours, the control group reported a greater degree of soreness than the group that received massage. However, the primary purpose of this study was to investigate the various physiological effects of massage on DOMS. The post-treatment measures found that massage did not alter the circulating neutrophil count, peak torque production on the isokinetic testing device, or available range of motion for the hamstring muscles. Yet individuals in the massage group did report a lower degree of soreness overall than those in the control group.

The finding that massage was helpful in reducing the intensity of DOMS compared to a control group is in line with other similar studies. However, the mechanism by which massage seems to do this is unclear. Since there were no significant differences in the various physiological parameters between groups, it is unclear why massage helps to reduce the sensations of DOMS. The authors of this study suggest that the effect may be more psychological than physiological.

While there is no clear understanding of the physiological rationale for why massage might reduce DOMS, it's likely it will still be used as an intervention to reduce DOMS. This is because there are so many subjective reports of benefit. However, statements that are routinely used to explain the phenomenon of reduced DOMS may not be accurate at all. For example, it is often stated that massage helps reduce DOMS due to flushing of lactic acid out of the sore muscles. We know physiologically that this does not occur. Yet there may still be benefit in reducing soreness.

One important consideration is that the authors stated there was no apparent physiological reason for massage to have this effect in reducing soreness. Yet, people still reported less soreness with massage than with the control treatment. This led to the suggestion that the effect may be more psychological than physiological. It is important to remember that stating an effect is more psychological than physiological doesn't necessarily make it less real. It does emphasize the power of the client's perceptions of the touch therapy. This is an effect that should be more thoroughly studied and evaluated because there is great potential for positive outcomes with many different conditions.