

A Review of Human Massage Therapy: Assessing Effectiveness Primarily from Empirical Data in the Human Species

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Claims for the efficacy of massage therapy must currently be viewed with caution until more hard data becomes available. Utilization of massage therapy as an effective treatment for post-exercise recovery from physical activity or in preparation for physical activity in horses cannot currently be supported by strong scientific evidence. Author's Address: Department of Kinesiology & Physical Education, Wilfrid Laurier University, 75 University Ave. W., Waterloo, ON, Canada N2L 3C5. © 2000 AAEP.

Introduction

Therapeutic massage is widely practiced on horses¹ as well as human athletes.² Among its reputed therapeutic benefits are quicker recovery following intense exercise, enhanced healing of skeletal muscles and connective tissue following exercise induced muscle damage, reduction of muscle soreness and swelling, attenuation of post-exercise inflammatory response, and promotion of muscle relaxation.^{2,3,4} Despite these and other claims related to the potential for massage to enhance aspects of physical work performance and the widespread use of massage on both humans and horses, relatively little empirical evidence has been gathered to support or refute the claims related to the efficacy of massage therapy.^{2,3,4} Hence the question: What can be made of the claims by therapists as to the value of massage treatments for horses or humans?

This review will look at some of the common benefits claimed by massage therapy, its suggested mechanisms related to muscle healing and recovery

from muscular work, and what limited scientific data there currently are to support or refute these claims.

Materials and Methods

Due to the paucity of empirical research on the effects of massage therapy on the horse, this review will present an overview of the current scientific literature related to massage therapy gathered largely from studies performed on human subjects. It will begin with a brief overview of the physiology of muscle damage, inflammatory response, and repair. It will then focus on the potential for massage to influence indices of post-exercise muscle recovery and repair processes. In this context, the potential for therapeutic massage to influence the physiological mechanisms of muscle damage and repair will be presented from both theoretical and experimental data perspectives.

The review will encompass most of the scientific experiment-based papers, and review papers published in reputable, peer-reviewed scientific jour-

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nals, related to the ability of manual massage to influence muscle damage and repair and post-exercise recovery of muscle function over the past 20 years which have employed a physical activity or athletic model. Representative examples of these papers are cited in the review.

Results

Massage therapy has been reputed to influence muscle healing following exercise-induced muscle damage. If indeed massage is able to influence post-exercise muscle damage or repair, it should do this by moderating one or more factors associated with physiological muscle damage/repair processes.³ Indices of exercise-induced muscle damage and repair include muscle swelling, sarcolemma and other membrane disruption, enzyme leakage, ultrastructural damage neutrophil and macrophage infiltration, and satellite cell activation.^{5,6} Physical symptoms associated with muscle damage repair include delayed onset muscle soreness (DOMS), prolonged muscle weakness, and muscle stiffness.^{2,3,6}

The effects of massage on most of these processes and symptoms of muscle damage and repair have not been extensively researched. In fact in most of these areas there is virtually no data available on the influence of massage. However, a few areas related to muscle damage and repair have received a bit more research attention. For example, a main supposition of massage therapy has been the suggestion that massage may be able to enhance muscle healing by inducing increased muscle blood flow, thereby making more oxygen, nutrients, and blood-borne factors such as neutrophils and macrophages more accessible to damaged tissue.⁷⁻⁹ About a dozen studies have attempted to ascertain the potential for massage to influence limb or muscle blood flow.^{2,3,7,8,10} While results have been variable, the majority of findings, particularly recent studies involving Doppler ultrasound-determined arterial and venous blood flow have failed to support any increment in muscle blood induced by any type of massage in large or small muscle groups in human subjects.^{7,8,11} No related studies on the horse appear to exist but because of their size, if anything, massage effect on muscle blood flow would most likely be attenuated in horses when compared to humans.

Post-exercise muscle inflammatory response and neutrophil/macrophage invasion of muscle is essential to subsequent muscle healing.^{6,12,13} Inhibition of this process leads to lack of muscle recovery, while an overstimulation of these processes potentially leads to inflammation-related tissue damage.¹²⁻¹⁴ Very few studies have attempted to examine the potential for massage to affect post-exercise muscle inflammatory responses.⁹ Those that have been conducted have used indirect measurement methods and have found little evidence that massage has any substantial effect on post-exercise muscle inflammatory processes.^{9,15}

Muscle swelling or edema is also characteristic of post-damage muscle inflammation. Theoretically, massage may be able to enhance lymph flow and thus potentially reduce muscle damage-induced edema.⁴ Because of measurement difficulties this possibility has never been directly measured.⁴ While some evidence exists as to the ability of massage to influence skin lymph flow, an early study using anesthetized dogs with artificially induced muscle edema reported that massage was no more effective than passive limb movement in stimulating muscle lymph flow.^{4,16} Thus, while massage could potentially influence lymph drainage, evidence for this effect is currently lacking.

A ubiquitous characteristic of exercise-damaged muscle is a prolonged (4–10 or more days) depression of the ability to generate force.^{5,17} This is likely due to exercise-induced structural disruption of sarcomeres which recover their integrity during the repair process.¹⁷ One study which directly examined the potential for massage to influence post-eccentric exercise return of muscle force over 4 days was unable to demonstrate any positive effect of massage therapy on this parameter.⁸

The ability of massage to remove muscle “toxins” or lactic acid has also been claimed to result in benefits to the healing of muscle damage and DOMS.^{11,15} It has been well established that lactic acid does not cause muscle soreness sensation^{6,18} and that lactic acid and “toxins” have no influence on exercise-induced muscle damage.^{5,6,18,19} Hence this suggestion can be dismissed outright. In addition, human studies have demonstrated that massage has no influence on post-exercise blood lactate clearance,^{11,20} while mild exercise can significantly speed up its removal.^{20,21} Since, as previously mentioned, massage has little influence on muscle blood flow, this finding is not surprising. Several recent studies have also found little consistent effect of massage on DOMS.^{2,8,9,15} One earlier study, albeit with a limited subject pool, also found no effect of massage on circulating levels of the potential analgesic hormone, β -endorphin.²²

It has often been suggested that massage can eliminate muscle stiffness and “knots” and induce muscle relaxation.^{2,23} While there is significant anecdotal evidence for such potential benefits, again empirical evidence for this is scarce and difficult to measure. Some limited evidence for reduced sympathetic activity post-massage is available,⁴ and two studies have suggested a reduced H-reflex response (a measure of muscle tone) in calf muscle during but not immediately following massage.^{24,25} However, evidence for a longer-term massage-induced muscle relaxation effect is just not available.

Several studies have also looked at the potential for massage to influence exercise performance and recovery from exercise-induced muscle fatigue. Although there is some conflicting evidence, the majority of these studies have found little or no evidence for any beneficial effect of massage treatment

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either before exercise, enhancing subsequent performance, or immediately post-exercise in aiding recovery from exercise induced fatigue.^{2-4,26} Studies using elite cyclists²⁸ and boxers¹¹ have also not substantiated post-exercise massage as an aid to rapid recovery of muscle function from exercise-induced fatigue in sports settings.

In contrast to the above data, two recent studies using rodent models have reported that augmented soft tissue mobilization (ASTM) and massage pressure have induced increased fibroblast presence in injured tendons.^{28,29} Since fibroblast activation and proliferation are essential in tendon healing, these findings suggest that massage may potentially be able to improve the rate of healing in damaged tendons and reduce the symptoms of tendonitis.^{28,29} Further studies will need to be performed utilizing actual clinical situations to validate these preliminary positive effects of massage treatment on recovery from tendon injury.

There are also several studies that have reported a significant psychological, relaxational, or mood-enhancing benefit of massage to the athlete.^{11,23,30} While not all studies have reported psychological or mood-related effects of massage,²⁷ these benefits are potentially of significant importance to human athletes.¹¹ Whether such effects occur, or are of any benefit in, an equine model cannot yet be determined.

Discussion and Conclusions

It is obvious that much more research is needed to establish the efficacy of massage therapy in influencing muscle repair and recovery from exercise. The limited amount of evidence currently available does not yet support the use of massage as an important therapeutic intervention in repair of muscle damage, long-term muscle relaxation, or in preparation for or recovery from exercise. However, recent studies using rodent models have shown promise for a positive effect of massage on enhancing healing of tendon-based injuries. There are also potential mood enhancing benefits of massage that need further validation. Lack of conclusive evidence for the beneficial effects of massage on aspects of muscle repair and comfort does not necessarily mean that massage is totally ineffective. Nevertheless, claims for the efficacy of massage therapy must currently be viewed with caution until more hard data becomes available. Utilization of massage therapy for post-exercise muscular recovery or pre-event preparation in horses cannot currently be supported by scientific evidence.

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