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Effectiveness Of Massage In Recovery From Exercise-Induced Muscle Injury In Older Adults

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Abstract

The study aims to evaluate massage as a recovery method for joint position, and balance after exercise-induced muscle injury in older adults. One hundred and seventy-five elderly patients performed an exercise session targeting the calf muscles (five exercises, six sets of 15 repetitions to induce muscle damage). The objectives of the study are to evaluate the role of massage and the Scottish cold shower in the recovery of older adult patients. After training, the participants underwent one of the recovery interventions: a 20-minute massage on the calves, a 12–15-minute Scottish cold shower on the lower limbs (12.5 ± 1°C). These interventions were administered immediately after exercise and again at 24, 48 and 72 hours over a period of 21 days. Conclusions: the measurements taken each time included muscle pain, joint position, and postural-balance balance. The treatments and the time allocated to repetitive massage significantly reduced muscle pain and improved balance. Conversely, although they alleviated muscle pain, they did not effectively prevent loss of muscle strength, balance deficits. Therefore, older people who engage in strength training can benefit from massage for longer to help with muscle recovery, improve balance, and reduce the risk of falls.

Keywords: massage, recovery time, muscle pain, stable and unstable balance, exercise.

Introduction

A decrease in muscle mass and strength is a typical aspect of aging (Akima et al., 2000), these changes being more pronounced in the leg muscles than in other muscle groups. This contributes significantly to an increased risk of falling (Vandervoort, 2002). Research indicates that after the age of 65, muscle mass decreases (Caught, 1978) by about 10% per decade, while muscle strength decreases by 26% to 41%. Of particular concern is the fourfold increase in the risk of falling due to muscle weakness (Delbaere et al., 2010) and atrophy. Strength training is widely recommended (Chirls, 1973) to counteract and even reverse these age-related declines in muscle function and motor control, thereby reducing the risk of falling (Fragala et al., 2019).

However, many older adults already struggle with reduced muscle mass, strength, and sense of joint position, making them more vulnerable to balance impairments (Dirks et al., 2014; Bean et al., 2004) stable and unstable. Additional deficits caused by exercise-induced muscles can further compromise postural control (Meshkati et al., 2011) and stability. Moreover, the pain and discomfort associated (Winter, 2009) with exercise-induced muscles may discourage older adults from engaging in workouts and intense physical activity. Therefore, when recommending strength training for older people, it is essential to consider both its long-term benefits and the short-term effects of different training protocols. Implementation of effective recovery interventions that relieve muscle injuries (Harridge et al., 1999; Rubenstein, 2006), improve balance and reduce the risk of falling.

Various recovery strategies have been explored to address exercise-induced muscle deficiencies. In addition to nutrition-based approaches, immersion or treatment with alternative cold-water jets and massage are frequently used techniques (Machado et al., 2016). While previous studies have investigated the effects of these methods on muscle strength and sense of joint position, most research has focused on younger populations. Treatment with alternate cold-water jets or immersion in cold water is believed to aid recovery by reducing muscle inflammation, minimizing swelling, and relieving pain. By decreasing muscle perfusion, or treatment with alternative jets of cold water can also prevent damage to secondary tissues and help restore muscle strength and strength. Proper and timely massage, on the other hand, is believed to facilitate recovery by reducing swelling and pain by eliminating accumulated extracellular fluid. Evidence suggests that massage can improve muscle strength, proprioception (Drouin et al., 2004), physical and overall mental performance after exercise. Some studies have shown that a 30-minute muscle massage after exercise can reduce muscle soreness and alleviate losses in strength and performance, while a 15-minute gastrocnemian massage can improve strength and proprioception.

Despite these findings, there is a lack of research on the effectiveness of these recovery methods for older adults, particularly in terms of muscle strength, sense of joint position, and balance. Given that lower limb strength and proprioception are key factors influencing overall physical and mental balance and performance (Lexell, 1995), further investigations into these recovery techniques could provide valuable information for athletes, coaches, and health professionals. This study aimed to determine whether treatment with alternative cold-water jets or immersion in cold water or massage could serve as effective methods of recovery after strength training by relieving exercise-induced muscle-related symptoms, especially decreased muscle strength, sense of joint position, balance in older adults. It has been hypothesized that both treatment with alternative cold-water jets and massage would be more effective than passive recovery in reducing these deficiencies and promoting post-exercise recovery.

Materials and Methods

Study design and setting

One hundred and seventy-five healthy older adults (aged 66 ±2 years, height 1.67 ± 0.05 m, weight 81.8 ± 2.7 kg) who consented to start exercising and volunteered for this study. Participants met the inclusion criteria of being at least 60 years of age or older, with no acute history, demonstrating the ability to engage alone without assistance in physical activities.

A medical professional carried out the initial screenings for all volunteers, but for those who were eliminated along the way and were not involved in data collection.

The exclusion criteria were based on a history of similar physical activity in the past 12 months, chronic pain, unstable cardiovascular conditions, or multiple psychiatric, neurological, or inflammatory disorders.

Table 1.

Inclusion and Exclusion Criteria of the Study

Inclusion Criteria	Exclusion Criteria
Adults aged ≥60 years	Patients diagnosed with motor and heart failure
Willing to do short-term and long-term exercise	Patients diagnosed with glenohumeral arthritis or instability
He agreed to the initial and final screenings performed by a medical professional	Patients diagnosed with neurological disorders affecting the shoulder
Willing to undergo a treatment with immersion in cold water or with alternative jets of cold water and massage	He did not agree with the initial and final screenings carried out by a medical professional
Patients who voluntarily provided informed consent for participation in the study	Patients who declined to provide informed consent for participation in the study

This study was a study carried out in groups, in parallel groups, with repeated measurements taken at baseline and at 24, 48 and 72 hours after the intervention.

Group I elderly adult patients who only wanted massage without undergoing a cold-water immersion treatment or alternative cold-water jets.

Group II elderly adult patients who wanted massage treatment and underwent treatment with immersion in cold water or with alternative cold-water jets

The older adult participants then went to a lab for baseline measurements, followed by the strength exercise protocol the next day. This protocol was designed to include standing calf raises with a weight, as well as standing and seated calf raises using a weight machine. After exercise, massage group I received a standardized 20-minute muscle massage, study group II was subjected to a 12-15-minute immersion in water at 12.5 ± 1°C.

Clinical evaluation

Demographic data, including age and gender, were collected for all 175 study participants.

To evaluate the effectiveness of the treatment, measurements and interventions were performed that were repeated 24, 48 and 72 hours after the exercises performed.

Exercise regimen for muscle tone and mobility

Prior to the initial assessments, the maximum exercise of older adult participants was determined for the 2 types of exercises: standing calf raises with a weight. If a participant successfully completed more than 15 repetitions, they rested for 20-25 minutes before attempting the exercise with a heavier weight.

Prior to the main exercise protocol, the older adult participants completed a 5-minute warm-up consisting of walking on a treadmill. After a 10-minute rest time, they performed an intense exercise training session under supervision. The training session consisted of six sets of 15 repetitions for each exercise, with a rest period of 5-10 minutes between sets.

Perceived exertion was measured in older adult participants by verbal ratio, i.e., the level of exertion within ten minutes of the session, specifically referring to how they felt just before completing the exercise.

Follow-up protocol and study endpoints

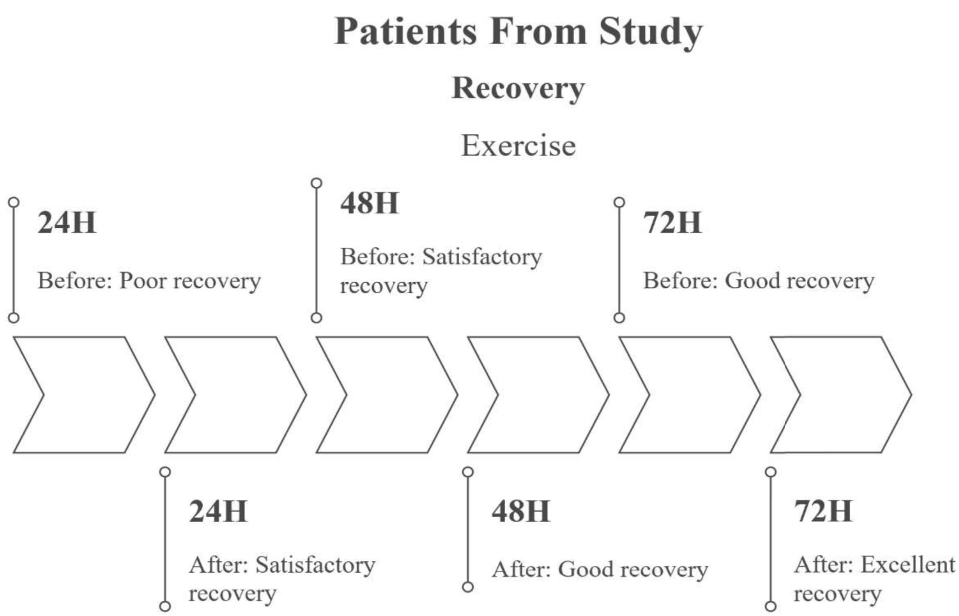
All patients followed a structured follow-up protocol to assess treatment efficacy and safety Older adult participants assessed their muscle pain using a VAS scale where 0 represented no pain and 10 indicated extreme pain. This method has been successfully used in research in the literature to track changes in pain perception after exercise.

Results

The patients were divided into age groups and were monitored according to the response to treatment during the three time intervals and had a standardized exercise protocol, adapted according to age.

Figure 1.

Distribution and evolution of patients by hours and treatment groups



For massage group I, a standardized 20-minute massage was administered to the calf muscles immediately after the exercise protocol. The therapist used various massage techniques, including effleurage, petrissage, and vibration. The massage began with 4-5 minutes of effleurage, which involved light caresses with the palms around the popliteal area, the Achilles tendon and the calf muscles. Then, 8 minutes of kneading techniques were applied, including kneading, two-handed circular lifting, and calf muscle pressing. Between kneading techniques, a 2-minute vibration was added, followed by a final 3 minutes of effleurage over the calf muscles.

Group II of elderly adult patients who had massage treatment and underwent a treatment with immersion in cold water or with alternative jets of cold water, alternated the massage with cold showers of water for about 60 minutes.

There were no significant differences between the two groups in terms of age, height, body mass and BMI after randomisation, and baseline measurements and training tasks were similar between groups (Table 2).

The results showed that the main significant effects for muscle pain had a delayed onset. Further analyses showed that muscle soreness was lower in the massage groups compared to the group that had massage treatment and underwent a cold water immersion treatment or alternate cold water jets.

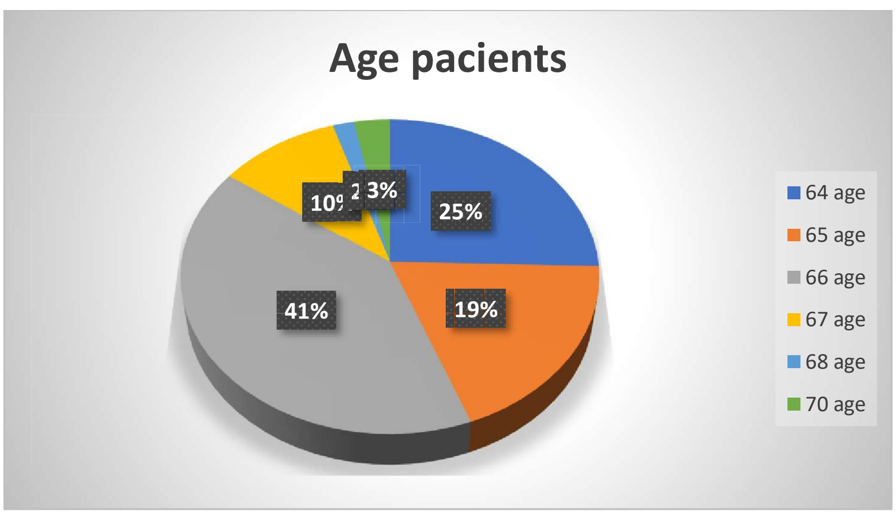
Table 2.

Key features for study participants.

Variables	Group I (n = 110) Medium ± SD	Group II (n = 55) Medium ± SD
Age (y)	68.2 ± 4	67.6 ± 4
Body mass (kg)	79.8 ± 6.1	79.5 ± 5.3
Height (m)	1.68 ± 0.05	1.68 ± 0.05
Body mass index (kg m−2)	27.8 ± 2.0	28.1 ± 1.6
Perceived valuation	13.9 ± 1.3	13.9 ± 1.3

Figure 2.

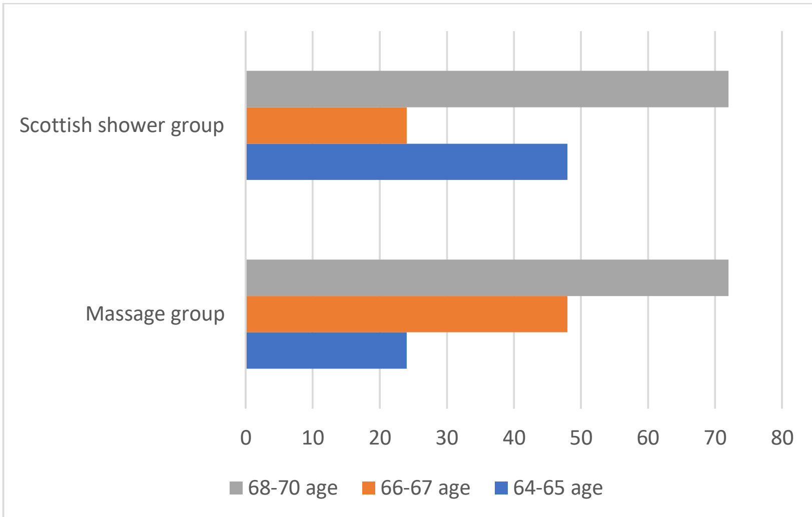
Gender distribution of elderly adult patients



The comparisons showed that the average score was higher in massage recovery group I compared to group II with massage and cold shower at 48 hours. At 24 hours, this difference was significant only in the massage group.

Figure 3

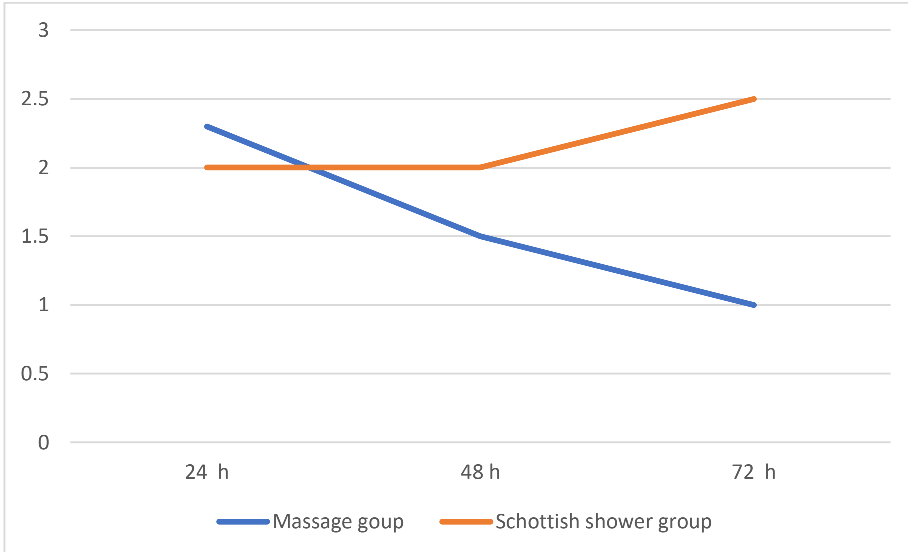
Representation of study groups and age during recovery of included patients.



Comparisons after recovery showed that muscle strength was lower in group II than in massage group I 48 hours after exercise, and at 72 hours group II complained of muscle soreness compared to the other group in the study.

Figure 4.

Representation of muscle pain by study groups at the 3 observed durations.



The study found that repeated massage helped reduce muscle soreness, improve proprioception, regain muscle strength, and relieve balance disorders in older adults. Despite the popularity of massage for post-exercise recovery, the evidence supporting its use is quite limited. In support of our findings, other studies have shown that post-exercise massage improves perceived recovery, reduces pain, and improves the physical and mental well-being of elderly adult patients.

Disscusions

The results obtained in this study show that massage applied repeatedly has beneficial effects on muscle recovery in older adults. Among the benefits observed are the reduction of muscle pain, improved sense of joint position, increased muscle strength and better postural stability. These effects are essential in preventing the risk of falling in this age group.

One of the possible explanations for the effectiveness of massage lies in its ability to stimulate local circulation and reduce muscle tension, which helps to reduce inflammation and muscle discomfort felt after intense physical exertion. In addition, muscle relaxation promotes better activation of proprioceptive receptors, which can lead to a more accurate perception of joint position and better coordination of movements.

Massage can also support the muscle regeneration process by positively influencing connective tissue and muscle elasticity, aspects that can support subsequent physical and motor performance. In contrast, interventions based on cold showers, although they had a moderate effect in reducing pain, did not demonstrate the same benefits in terms of recovery of strength, balance and proprioception.

It is important to note that the success of recovery interventions can be influenced not only by the nature of the techniques applied, but also by their frequency and duration, as well as by the individual reaction of each participant. Thus, the positive results obtained in the group that received only massage can be correlated with the consistency of its application and with the high degree of tolerability and acceptance by the participants.

In conclusion, regular massage, applied after strength training, can be an effective and accessible method of recovery for older adults, helping to reduce post-exercise discomfort and improve motor skills essential for maintaining functional independence.

Conclusions

The results of the study indicate that massage is an effective method of recovery after intense physical exertion in older adults. Applied repeatedly, it helps to reduce muscle pain, supports the restoration of muscle strength and promotes better postural stability. Thus, massage can play an important role in reducing the risk of falls, by improving essential factors such as balance and sense of joint position.

In contrast, interventions based on cold showers showed limited effects, mainly in terms of reducing discomfort, without generating significant improvements in functional parameters such as strength or balance.

Based on these findings, it can be recommended to integrate massage as a strategy to support physical recovery in training programs for active seniors or in the rehabilitation of older people at risk of falling. It is important that such interventions are tailored individually, taking into account the overall health, exercise tolerance and specific needs of each participant.

Limitations

This study, although it provides relevant results on the effectiveness of massage in the recovery of older adults after intense exercise, has some limitations that must be taken into account. First, although participants reported that they did not use supplements or medications during the study period, they did not objectively monitor their eating habits or consumption of substances with a potential effect on recovery, which could have influenced the results.

A placebo group was also not included, making it difficult to differentiate the physiological effects of massage from psychological influences. It is possible that part of the benefits reported by participants are related to the positive expectations associated with massage therapy, known for its strong placebo effect in the context of pain and well-being.

Another limitation is related to the fact that the study was carried out in a controlled setting, which may not fully reflect the real living conditions of the elderly. Individual differences in previous physical activity level, pain sensitivity or muscle stress response were also not taken into account.

To reinforce these results, future research should include closer monitoring of external variables (diet, lifestyle), as well as a placebo group to more clearly isolate the therapeutic effects of the interventions analyzed.

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