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The Effectiveness of Sport Massage In Reducing Doms Pain In Athletes: Literature Review

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Abstract
When you do excessive exercise, you may start to feel pain in the muscles you use, such as your joints, bones and limbs. Complaints of pain or soreness caused by excessive exercise are called delayed onset muscle soreness (DOMS). The aim of this study was to determine the effectiveness of sports massage in reducing pain in doms. This study used a literature review approach. A literature review is a comprehensive analysis (not just a summary) of scientific documents directly related to a research question. The literature review was carried out using PICO searches in several databases such as Google Scholar. Criteria were met in 5 reviews that reported sports massage performed 3 times a week for 4 weeks for 20 minutes with moderate pressure (2 cm depth). Of the several articles found, most used RCTs, quasi-experimental study designs and clinical trials with $P<0.05$. Both the experimental and control groups received sports massage. It can be concluded that sports massage is effective in speeding up the athlete's recovery process.

Keywords: athlete, pain, DOMS

INTRODUCTION

Sports have many benefits for human health and can be felt by everyone. It is undeniable that exercise is a lifestyle that everyone does to keep their bodies healthy and fit (Graha & Yuniana, 2021). As an activity to get physical fitness and health, sports or physical activity must be done regularly. (Suharjana, 2013) stated that physical activity or exercise will affect the improvement of the function of body organs such as muscles which include hand muscles

(Awang et al., 2017), nerves, heart, blood vessels, respiratory organs, and body biochemistry. That is, from these activities a person will get health benefits by exercising, also the ability of muscle performance will increase. It is caused by physiological changes that occur in the neuromuscular system.

When doing excessive exercise is likely to begin to feel pain in the muscles used such as joints, bones and limbs. Complaints of pain or pain caused by excessive exercise are called delayed onset muscle soreness (DOMS). DOMS that arises after exercise can result in pain that appears for a while (delayed).

Pain characterized by pain due to DOMS will appear when going to move, but the pain is not felt when resting. DOMS can be experienced by everyone, be it beginners or professional

athletes after doing exercises, muscle pain will be felt. The pain caused after exercising will interfere with daily activities due to excessive exercise load (Duhé, 2015).

The body cannot move freely due to pain in the muscles, this can cause the activities carried out to be problematic, for workers it can certainly interfere with productive work, also for students or students can cause laziness with limited movement felt, while this in high-intensity sports can make people think negatively about sports. After carrying out exercise, there are often people who ignore stretching, as for what is done, which is to immediately rest passively. DOMS can also cause pain and functional limitations that will adversely affect a person's performance in sports activities, besides that pain in DOMS only lasts for 24-48 hours, is mild to moderate. DOMS can heal on its own, but it takes time so that DOMS can interfere with daily activities, training programs and athletes who will compete (Prihantoro & Ambardini, 2018).

If the muscle is damaged by tissue, the body will automatically respond by repairing the damage and stimulating sensory nerve endings so that pain will arise due to these stimuli. The occurrence of DOMS when you first do high-intensity exercise and excessive muscle work occurs. DOMS is usually inflicted primarily by eccentric exercises such as down-hill running, plyometrics, and exercises with prisoners.

Basically, muscle pain that arises is caused by every movement that is not usually done, therefore it is one of the movements that make the muscles contract lengthwise. Based on the explanation that has been described, in preventing the occurrence of delayed onset muscle soreness, it is necessary to conduct comparative research to determine the effect of sports massage (Prastowo & Arovah, 2014) and stretching in reducing delayed onset muscle soreness after high-intensity exercise

Muscle fatigue occurs due to exercises performed with high intensity and volume that cause discomfort in muscle structures ranging from intracellular, extracellular and sarcolema, with this can affect pain in the muscles or often called delayed onset muscle soreness (DOMS) (Kim et al., 2014). DOMS or delayed onset muscle soreness is a type 1 strain injury, the sensations associated with DOMS vary greatly ranging from mild muscle tension that can interfere with physical activity and pain that limits each movement (Pearcey et al., 2015).

The sensations experienced with this injury can vary from mild muscle stiffness that heals quickly with normal daily activities to pain that is severe enough to limit every movement. Quoted from (Kantanista et al., 2016) stated that the factors associated with DOMS are mainly caused by tearing of muscle connective tissue and insertion of its tendons, they found that the secretion of the amino acid hydroxyproline, a specific product of connective tissue damage, was higher in those who experienced muscle pain than in those who never experienced muscle pain.

METHODS

This study used a literature review approach. A literature review is a comprehensive analysis (not just a summary) of scientific documents directly related to a research question. In other words, the literature shows the congruence between the text and the formulated research question. Depending on the need, a literature review can be a stand-alone task or an introduction to a larger research project. (University of West Florida, 2020).

Literature Review in PICO format:

(P=Population) Athletes, (I=Intervention) Sports massage, (C=Comparative) noncomparative, (O=Outcome) Sports massage is effective in pain reduction. The reviewed

research journal articles are limited by inclusion and exclusion criteria, with journal entries for the last 10 years, namely 2013 to 2023.

Articles will be reviewed if they meet the following inclusion criteria: (i) the subjects of the study are athletes who have injuries due to sports-related conditions with an age range of 17->67 years

Research articles will be rejected if the author meets the following exclusion criteria:

(i) research using systematic review methods, (ii) research journals under 2013, (iii) subjects refused to participate. Author Get information based on Database journals such as Google Scholar Addressing in research will be accepted by the author any effect of intervention from each article impacting or not the research sample. To summarize the data the author summarizes the article based on the research subject, age and sex of participants, the type of intervention given (both from frequency, duration, and measuring instruments), the effectiveness of the intervention)
Research instruments using

DOMS: muscle pain and stiffness that develops for 24-72 hours after exercise or physical activity. This muscle pain occurs due to tissue damage to the muscles due to heavy and prolonged use, continuous contractions, and doing unusual activities (Annafi &; Mukarromah, 2021). Excessive physical activity can cause injury, muscle damage or connective tissue in the muscles. If the muscle is damaged by tissue, the body will automatically respond by repairing the damage and stimulating sensory nerve endings so that pain will arise due to these stimuli. The occurrence of DOMS when you first do high-intensity exercise and excessive muscle work occurs

Lactic acid: Oxygen is necessary for the normal process by which the body converts glucose into usable energy. During periods of intense activity, even heavy breathing may not provide enough oxygen to maintain the required energy levels. At this point, the body must switch to anaerobic (without oxygen) methods of energy production.

Lactic acid (commonly known as lactic acid) is then temporarily produced to help break down glucose and energize your muscles. As soon as activity decreases and more oxygen becomes available, lactic acid production stops. Lactic acid increases the acidity of muscle tissue, causing a burning sensation during intense exercise. However, this is not the cause of muscle pain that occurs a day or two after exercise.

This pain (delayed muscle pain, or DOMS) is not fully understood, but it is most likely caused by minor damage to muscle tissue and an inflammatory response as the body repairs the damage. Participants' lactate levels were measured at rest, at the end of exercise, during mid-recovery, and at the end of recovery as follows: First, wipe the fingertips with an alcohol swab, then use a pen to pierce. Next, 0.2 µl of blood flowing from the surface of the skin is exposed to the Lactate Scout device kit and the mmol/L value is easily determined.

Visual analogue scales (VAS): A psychometric instrument for recording the severity characteristics of disease-related symptoms in individual patients, and their use in rapid classification of symptom severity and disease management (statistically measurable and reproducible). Visual analog pain scale (VAS), monofilament sensitivity test, grip strength, lateral pinch, pulp-to-pulp pinch, and tripod pinch.

All tests are performed by a physical therapist who specializes in hand therapy. The visual analogue pain scale (VAS) is used to measure patient-reported pain on a scale from 0 (no pain) to 10 (worst pain).

Sport Massage: a set of special massage techniques / methods tailored to the needs of

athletes and athletes. A massage method that uses the hands to massage the muscles of the body. Sports massage operating technology is specifically designed to rub and massage the skin and muscles, and when done correctly in 14 strokes, will improve the smooth circulation of blood and hydration in the body. Sports massage has the effect of reducing stress, increasing tissue elasticity and eliminating lactic acid production.

The general public in Indonesia considers sports massage as the most effective way to stimulate the breakdown of lactic acid in muscles. In general the objectives of this sports massage are: 1. Improve blood circulation, 2. Stimulate innervation especially peripheral nerves, increase sensitivity to stimuli. 3. Increase muscle tone (tension), increase muscle elasticity and flexibility, and increase muscle labor. 4. Cleanses and smoothes your skin. Sport as a science has many benefits for athletes. Massage methods performed after high-intensity exercise are often preferred by athletes to improve the body's rest process and muscle recovery. This is a method of sports massage rehabilitation performed by sports massagers of the lower extremities. Participants performed effleurage, petrissage, friction, and effleurage for a total time of 20 minutes per minute.

Numeric Rating Scale (NRS): is a pain measurement tool with values from 0 to 10 where a value of 0 means no pain and a value of 10 which means pain that is felt very extreme.

RESULTS AND DISCUSSION

Of the 5 journals that can be researched through *Screening, Eliligibility* and *inclusion*. *Sport Massage* is one of the physiotherapy treatments that uses massage techniques so as to reduce pain, reduce pressure on the muscles.

Table 1. Comparison of *Experimental Group* and *Control Group*

Reviewer	Participant		Intervention		Measurement	Results	Design Study
	Intervention group	Control group	Experimental group	Control group			
(Andersen et al., 2013)	n= 20 18 – 67 Years	-	Sport Massage	No intervention	NRS	p<0.05	Randomized Controlled Trial
(Boguszewski et al., 2014)	n= 15 24 – 26 years old	-	Sport Massage	No intervention	VASE	P<0.05	Clinical Research
(Almeyda & Hakim, 2022)	n= 36 37 years old	-	Sport Massage	No intervention	VASE	P<0.05	Pre-experimental research
(PUTRI, 2022)	n= 24 17 – 19 Years		Sport Massage	No intervention	VASE	P<0.05	True Experimental
(Fitrianto et al., 2023)	n= 30 20 - 22 years	-	Sport Massage	No intervention	VASE	P<0.05	experimental

Based on a literature review study, the authors found that of the 125 sample results the average was dominated by the age of 17 – 67 years. Of the many literature found, most literature uses RCT research design, Clinical Research Pre Experimental, True Experimental, Experimental with P<0.05. The experimental group was given *Sport Massage intervention*.

Table 2. Sport *Massgae Intervention Therapy Dosage*

Reviewer	Type of Intervention	Therapeutic Dosage				Duration Therapy
		F	I	T	T	
(Andersen et al., 2013)	Effleurage, Petrissage, Shaking, Tapotement, Walken, Vibration, Skin Rolling	for 15 seconds multiplied by 6	Slight pressure	Sport Massage	15 min	15 minutes during recovery period
(Boguszewski et al., 2014)	Effleurage, petrissage, friction	for 10 seconds multiplied by 6	Slight pressure	Sport Massage	20 min	20 minutes during recovery period
(Almeyda & Hakim, 2022)	Effleurage, Petrissage, Shaking, Tapotement, Walken, Vibration, Skin Rolling	For 10 seconds multiplied by 5 pulses of 1 minute.	Slight pressure	Sport Massage	30 min	30 minutes during recovery period
(PUTRI, 2022)	Effleurage, Petrissage, Shaking, Tapotement	for 10 seconds multiplied by 6	Slight pressure	Sport Massage	25 min	25 minutes during recovery period
(Fitrianto et al., 2023)	Effleurage, Petrissage, Shaking, Tapotement, Vibration, Skin Rolling	for 10 seconds multiplied by 6	Slight pressure	Sport Massage	20 min	20 minutes during recovery period

Based on research that has been done, researchers found that there are several types of *massage* movements that can be applied to *recovery* such as *Effleurage, Petrissage, Shaking, Tapotement, Walken, Vibration, Skin Rolling* with a frequency of 10 seconds multiplied by 6, *Intensity of Slight pressure*, with a duration of 20 minutes during the recovery period.

Table 3. Mean of Study Characteristics

Reviewer	Measurement	Group experiment		Control group		Significant
		Pre	Post	Pre	Post	
(Andersen et al., 2013)	NRS	0,47	0,52	-	-	p<0.05
(Boguszewski et al., 2014)	VASE	57.3 ± 5.0	57.0 ± 5.3	-	-	P<0.05
(Almeyda & Hakim, 2022)	VASE	8.00	5.00	-	-	P<0.05
(PUTRI, 2022)	VASE	5,58	3,33	-	-	P<0.05
(Fitrianto et al., 2023)	VASE	20.0 ± 2.2	59.4 ± 9.0	-	-	P<0.05

Based on the table above, when compared with the control group, the intervention group showed a good and significant improvement.

Discussion

The effectiveness of massage in reducing muscle pain was studied by Willems et al., found massaged limbs recover faster and show less pain. A similar conclusion was reached by Zainuddin et al., who showed a reduction in swelling due to massage therapy. The results of this study confirm the above observations. The results also lend credence to the idea that the possible benefits of massage therapy are based on an increase in tissue temperature.

The results of an experiment conducted by Petrofsky et al. Satan stated that dry and humid heat is very effective in reducing pain and muscle damage after exercise. However, there are reports in the literature that state so do not confirm the health effects of post-workout massage

therapy. Robertson et al. evaluated the effects of lower extremity massage on recovery after intense exercise on the ergometer.

No measurable physiological effects were observed after massage therapy when compared to passive rest Another example was given by Dawson et al. who examined the effect of massage on lower limb strength, swelling and pain after a half marathon. No significant difference ($p > 0.05$) was found, although an increase in more than half of the subjective measures examined might indicate that

From the results of data processing carried out, there is an effect of sports massage on reducing DOMS pain as passive recovery of the lower extremities.

This is similar to the statement (Poppendieck et al., 2016) that several strategies have been used to minimize or even accelerate the recovery of symptoms caused by muscle damage due to physical exercise including by providing sports massage treatment.

The results of this study are in accordance with the results of research conducted by (Syarifudin & Roepajadi, 2019) that the provision of local mass of the lower extremities as passive recovery can accelerate the body's recovery in leg muscle strength after doing exercises and research conducted by (Muttaqin et al., 2020) there is an influence of sports massage before badminton on increasing doms and the average treatment of sports massage before badminton sports training activities.

Thus the results of this study can be used as input and evaluation for coaches or management of the men's national sepak takraw team in providing an additional model of passive recovery by providing sports massage in the lower extremity area, to help accelerate the recovery of DOMS pain in the strength of the lower extremities, so that the condition of the body is comfortable when carrying out the exercise program.

CONCLUSION

Massage therapy speeds recovery and improves muscle health efficiency and can serve as an effective treatment of muscle pain, especially during sparring. Seasons in which athletes must perform optimally with limited breaks. Massage therapy leads to a more rapid decline pain after supramaximal effort.

One of the main advantages of massage seems to be its analgesic effect and suggests that it be widely applied in sports, physical therapy, and rehabilitation. The results of this study indicate the need for additional research including larger samples and the use of more objective investigative tools.

Based on the results of research conducted that: (1) there is an effect of sport massage in reducing delayed onset muscle soreness high intensity exercise; (2) There is an effect of stretching in reducing delayed onset muscle soreness of high-intensity exercise. However, in this case, the results of the posstest visual analog scale measurement show that sport massage and stretching are included in the moderate category, but the percentage of sport massage and stretching shows different score results.

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