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## Impact of sore muscles after strenuous exercise and their preventions

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### Abstract

Delayed onset muscle soreness (DOMS) is the phenomenon of muscle pain, muscle soreness or muscle stiffness that occurs in the day or two after exercise. DOMS is nothing but ultra microscopic tearing of muscle fibers which depends on the intensity and length of exercise and exercise type. It is most frequently felt during the beginning of a new exercise program, changing exercise routine, or suddenly increasing the intensity of exercise routine. Numbers of people think that cooling down by exercising at a very slow pace after exercising more vigorously, helps to prevent muscle soreness; it doesn't. Stretching does not prevent soreness either, since post-exercise soreness is not due to contracted muscle fibers. The objective of the present study is to find ways and means to effectively deal with muscle soreness. Application of preventative strategies and curative aspects are very good tools to prevent muscle soreness.

**Keywords:** Sore muscles after strenuous exercise and their preventions

### Introduction

The exact cause of Delayed onset muscle soreness is unknown. Gradually increasing discomfort that occurs between 24hrs to 48 hrs after exercise is called delayed onset muscle soreness (DOMS) (1902 by Theodore Hough) or Muscle fever. It is described as a consequence of mechanical and metabolic stress placed on skeletal muscle fibers. DOMS occurs as a result of microscopic tearing (micro trauma) of the muscle fibers and connective tissues. The extent of the tearing depends on the type of exercise and how vigorously the exercise is performed. Any new movements that a person is not accustomed to, may lead to DOMS.

It is most frequently felt during the beginning of a new exercise program, changing exercise routine or suddenly increasing the duration or intensity of exercise routine. DOMS describes the phenomenon of muscle pain due to ruptures within muscle, muscle soreness or muscle stiffness that occurs in the day or two after activity. It is one of the temporary changes and symptoms associated with exercised induced muscle damage. Such change includes decreased muscle strength and range of motion results swelling of muscle. It is the pain and stiffness felt in muscles several hrs to days after sever exercises.

### Characteristics

DOMS is a term experienced by all individuals, no matter their fitness level. If an individual has recently begun exercising, or has just returned to exercising after a long break, they may soon become stiff and sore. This is a normal physiological response to increased exertion on any skeletal muscle. Muscle pain is not felt when the muscle is at rest, but rather when it is stretched, contracted or put under pressure.

The intensity of the symptoms will increase for the first 24 hours, reaching their peak within 72 hours; it subsides and disappears after few days. Not all symptoms may be present and they are independent of each other. The extent and duration of DOMS may vary from person to person, and the extent of DOMS is often related to the amount of resistance placed on the muscle during the prior exercise.

Characterized by an aching, dull pain in the affected muscle, typical symptoms may include such as Muscle tenderness, stiffness and / or soreness, it may increase to the level of muscle

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pain (which in medical terms said as -muscular mechanical hyperalgeria), swelling (may be considered a cause and contributor to soreness), Loss of mobility, reduced range of motion, resistance to stretching and Loss of muscle strength. Any changes to your routine exercise can lead to timely injuries in your muscle fiber and connective tissues.

### Objective

The purpose of the present study is to find ways and means to effectively deal with sore muscle.

### Causes of Sore Muscles

Due to extreme physical exertion, fibers in the muscles tear and the body's defense mechanism sends fluid into these areas – causing swelling. The swelling triggers the pain, stiffness and soreness is felt. The body, however, repairs the injured muscle and it grows back stronger. The main and ultimate thought is to be result of micro trauma - mechanical damage being exercised. DOMS a result of microscopic tearing of the muscle fibers depends on intensity and length of exercise and exercise type. Any movement that are not accustomed to can lead to DOMS, Examples- going down stairs, running downhill, lowering weights, downward motion of squats and push-ups, muscle tears etc. Routine exercises can lead to tiny injuries in your muscle fibers and connective tissue. Joints feel sore and achy called osteoarthritis – inflame condition as you get older.

While actively participating in the exertion as when sprain, strain or tearing of a muscle and immediate pain is felt. It takes at least 8 hours to 24 hours to feel this type of soreness. It is assumed that muscle soreness is caused by a buildup of lactic acid in muscles, but now it is understood that lactic acid has nothing to do with it because from the time you exercised, yet the lactic acid buildup only lasts in your muscles for at most an hour or two after your workout is complete. Cool-down periods speed up the removal of lactic acid from muscles. Lactic acid is extremely important because it allows the body to convert glycogen to energy without the need for the presence of oxygen. Muscle soreness is caused by damage to the muscle fibers themselves. Muscle biopsies after hard exercise show bleeding and disruption of the z-band filaments of muscle sacomere that hold muscle fibers together as slide over each other during a contraction. This may physiologically causes that actin and myosin cross linkage to separate prior to relaxation but it does not cause muscle soreness.

### Treatment for Sore Muscles

A significantly effective treatment method has not yet been established to accelerate the recovery from DOMS and there is no one simple way to treat. A variety of treatment strategies may assist in alleviating the symptoms and severity of DOMS. If your muscle soreness does not get better within a week consult your physician. In the past, gentle stretching recommended to reduce exercise. (Australian researchers 2007)

### Preventions

- **Warm-up:** Warm Up thoroughly before activity and before exercising. Remember to warm up the body with simple movements like arm swings and marching on the spot, or start walking slowly and gradually pick up the pace.
- **Progress slowly:** The most important prevention method is to gradually increase exercise time and intensity. Do

not stop exercising completely. The fact that you are experiencing muscle soreness after a workout is a sign that your muscles have been stretched and are slowly getting stronger. By using your muscles (with light activity), you can speed up the elimination of lactic acid buildup.

- **Cool down:** Cool Down with gentle stretching after exercise. Stretch your muscles for about 10 minutes after a rigorous workout to prevent sore muscles.
- **Have an electrolyte:** Carbohydrate replacement drinks like Gatorade (energy drink).
- Start a new weight lifting routine with light weights and high repetitions (10-12) and gradually increase.
- Avoid making sudden major changes in the type of exercise and the amount of time that exercised.
- **Physical trainer:** Take the help of a physical trainer / therapist, who can show you how to exercise safely and how to keep good posture so that you don't get injured or worsen joint pain, if there is inability to start a workout program that is safe and effective and if possible.

### Remedies

**Active Recovery:** In this performing easy low-impact aerobic exercise technique has to be used as a part of cool down which increasing blood flow with diminished muscle soreness.

**Stretching:** Stretching gets blood flowing through the area diminishing pain and speeding up recovery. Remember to hold a stretch for at least 10 seconds and not to bounce.

**Yoga exercises:** (Instructor is necessary) there is growing support that performing yoga may reduce DOMS. It can help stretch tired and achy muscles and increases flexibility, concentration and strength which can be a positive result. After a tough workout, sore muscles can leave you feeling tight, tense, and just plain uncomfortable. If you're up for some active recovery, this quick yoga sequence is some of the best medicine out there for tired muscles. When you've completed this short and effective session, your body will feel opened up and energized yet calm. It offers a serious stretch to your whole body - especially those tight spots that need it the most!

**R. I. C. E. Treatment:** The standard method of treating acute injuries. If your soreness is particularly painful. Direct Icing or Ice can help reduce swelling, soreness and lessen the aches, if it is applied within first 24 hrs. If it's an acute injury, or if one notices swelling of the muscle or joint area and it feels warm, wrap an ice pack in a thin towel and place it on the sore muscles for about 15 minutes.

**Go for a massage:** Tension and stress can affect a person's body and can cause stiffness and pain in a person's neck and back. Whole body massage will help to relax very tight sore muscles and relieve muscle aches. It may help reduce reported muscle soreness and reduce swelling. Preferably get massage done by an expert.

**Hot and cold shower:** Which may loosen tight muscles and boost blood circulation, providing temporary relief. Shower which give relief to the sore muscles as well as healing process and also your blood vessels to open and close which flushes lactic acid out from muscle but has no big impact on DOMS. It is recommended that the shower be alternated with

and end with cold water.

Rosemary (herb) can help remedy for muscle aches which have anti-inflammatory properties which reduce soreness and speed up the healing process. Soak a cloth in the rosemary and place the cloth over the aching muscle.

### **Conclusion**

Just because S not sore doesn't mean your muscles aren't inflamed and growing. Likewise, sore muscles don't mean you had a good workout. People just assume that hard workouts = sore muscles = effective. But that's not the case. It's a case where correlation is mistaken for causation. Muscle soreness or delayed onset of muscle soreness is inevitable for active people. Proper knowledge of its causes, prevention strategies and remedial measures can reduce the inconvenience encountered.

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