



## Review Article

# Rehabilitation of hamstring muscle injuries: a literature review<sup>☆</sup>

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### ABSTRACT

Hamstring injuries are among the most frequent in sports. The high relapse rate is a challenge for sports medicine and has a great impact on athletes and sport teams. The treatment goal is to provide the athlete the same functional level as before the injury. Thus, functional rehabilitation is very important to the success of the treatment. Currently, several physical therapy modalities are used, according to the stage of the lesion, such as cryotherapy, laser therapy, therapeutic ultrasound, therapeutic exercise, and manual therapy. However, the evidence of the effectiveness of these modalities in muscle injuries is not fully established due to the little scientific research on the topic. This article presents an overview of the physiotherapy approach in the rehabilitation of hamstring muscle injuries.

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### Reabilitação nas lesões musculares dos isquiotibiais: revisão da literatura

#### RESUMO

As lesões dos isquiotibiais estão entre as mais frequentes do esporte. A alta taxa de recidivas representa um desafio para a medicina esportiva e apresenta grande impacto para atletas e clubes esportivos. O objetivo do tratamento é proporcionar ao atleta o mesmo nível funcional anterior à lesão. Dessa forma, a reabilitação funcional é muito importante para o sucesso do tratamento. Atualmente, usam-se várias modalidades fisioterápicas de acordo com o estágio da lesão: crioterapia, laserterapia, ultrassom terapêutico, terapia manual e cinesioterapia. Entretanto, as evidências da eficácia dessas modalidades nas lesões musculares ainda não estão completamente estabelecidas, devido à baixa investigação científica sobre o tema. O

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presente artigo apresenta uma revisão sobre a abordagem fisioterápica na reabilitação das lesões musculares de isquiotibiais.

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## Introduction

Hamstring injuries are some of the most frequent in the field of sports medicine.<sup>1,2</sup> A prospective study by Elkstrand et al.<sup>3</sup> demonstrated that they account for 37% of muscle injuries in professional soccer players and for 25% of athletes' absence in games. Other studies indicate that one-third of hamstring injuries relapse and that many of these relapses take place within the first two weeks after returning to sport.<sup>4,5</sup> This high recurrence rate may be related to a combination of factors, such as ineffective rehabilitation and inadequate criteria for return to sport practice.

The goals of hamstring injury rehabilitation are to achieve the same functional level observed prior to injury and to allow for the return to sports practice with minimal risk of recurrence.<sup>6</sup> Many interventions are widely used to achieve full rehabilitation. These include PRICE (protection, rest, ice, compression, and elevation), to control the inflammatory process<sup>7</sup>; therapeutic exercises to strengthen and restore the functionality of the musculature<sup>8</sup>; photothermal therapy for inflammation modulation<sup>9</sup>; massage and mobilization to realign and relieve tension of soft tissues<sup>10</sup>; joint and nerve manual therapy<sup>11,12</sup>; and functional rehabilitation. However, evidence of the effectiveness of these treatment modalities is not yet fully established, due to the sparse scientific research on the subject.

Therefore, the present study aimed to investigate the current evidence on physical therapy approaches used in the rehabilitation of hamstring injuries.

## Methods

A literature review in the databases PubMed, LILACS, SciELO, and the Cochrane Database of Systematic Reviews (Cochrane Library) was made. The following keywords were used: muscle injury, hamstrings injury, muscle strain, functional rehabilitation, and physical therapy.

The inclusion criteria for this study were studies with high quality evidence, such as systematic reviews, meta-analyses, randomized controlled trials, and classical studies relevant to the proposed goals. The exclusion criteria were articles that did not match the proposed theme.

## Classification

Muscle injury is characterized by changes in the morphological and histochemical aspects that create a functionality deficit in the affected segment.<sup>13</sup>

There are two major forms of muscular injury in sports: muscle strain and contusion.<sup>14</sup> Strain is the most common

muscle injury in sports, and is classified as follows: grade I, in which there is minimal structural disruption and rapid return to normal function; grade II, in which there is a partial rupture, with pain and some loss of function; and grade III, in which a complete tissue rupture is observed, with muscular retraction and functional disability.<sup>15</sup> Ekstrand et al.<sup>3</sup> demonstrated that hamstrings are the muscles most affected by this type of injury.

The other form is muscle contusion, which is a direct result of external trauma forces, common in contact sports. It is characterized by the presence of pain, swelling, stiffness, and range of motion restriction.<sup>15</sup> It can affect any muscle, but the quadriceps and the gastrocnemius are the most commonly affected.<sup>14</sup>

A new comprehensive classification system, known as the Munich consensus, was developed by specialists<sup>16</sup> and distinguishes four types of injury. The first group is the functional muscle disorders, comprising type 1 (disorders related to overexertion) and type 2 (disorders of neuromuscular origin). These disorders are characterized by not presenting evidence of macroscopic lesions in the muscle fiber. The classification also includes structural muscle disorders, comprising type 3 (partial muscle injuries) and type 4 (total or subtotal lesions that may present tendon avulsion). In these cases, there is macroscopic evidence of injury, i.e., structural damage. Subclassifications are given for each type.

## Injury mechanism

Two specific mechanisms are described for hamstring injuries, which appear to influence the location and severity of the injury. Heiderscheit et al.<sup>6</sup> demonstrated that, during terminal swing phase of running, the hamstrings absorb elastic energy to contract eccentrically and promote deceleration of the limb's advance in preparation for the initial contact of the calcaneus. In this phase, muscles become more susceptible to damage; the biceps femoris muscle is the most affected, as it is more active than the semitendinosus and semimembranosus muscles.<sup>17,18</sup>

Another mechanism that commonly damages the proximal portion of the semitendinosus muscle is a movement of combined high power and extreme range of hip flexion with knee extension, which biomechanically matches the movements of kicking, running hurdles, and artistic dancing.<sup>19,20</sup>

## Risk factors

The proposed risk factors for hamstrings injuries are classified as modifiable and non-modifiable.<sup>21</sup>

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