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# Progressive Rehabilitation Programe in a Competitive Sprinter with Gluteal Strain: A Single Case Study

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**ABSTRACT**

**Background:** Gluteal muscle strains are common among sprinters due to repetitive explosive hip extension, acceleration, and high mechanical loading during sprinting activities. The gluteus maximus plays an important role in sprint performance, pelvic stabilization, and force generation. Injury to this muscle can significantly affect athletic performance, gait mechanics, and functional movement. Early physiotherapy rehabilitation is essential to reduce pain, restore muscle strength, improve mobility, and prevent recurrence.

**Aim:** To evaluate the effectiveness of a progressive rehabilitation program in a competitive sprinter with grade II gluteus maximus strain.

**Clinical Description:** A 21-year-old male sprinter presented with pain over the left gluteal region during sprinting and stair climbing activities. Ultrasound examination confirmed grade II gluteus maximus strain.

**Intervention:** A structured 8-week progressive rehabilitation program was implemented consisting of pain management, mobility exercises, core activation, strengthening, functional retraining, and return-to-sport progression.

**Outcome Measures**

- Visual Analogue Scale (VAS)
- Manual Muscle Testing (MMT)
- Sport-specific functional movement testing

**Results:** VAS scores improved from 6/10 to 0/10 by the end of rehabilitation. MMT improved from grade 3/5 to 5/5. Functional performance improved significantly with pain-free sprint-specific movement.

**Conclusion:** A structured progressive rehabilitation program effectively improved pain, strength, and functional performance in a competitive sprinter with gluteal strain. Sport-specific rehabilitation enabled safe return to athletic activity.

**Keywords:** Gluteal strain, Sprinting injury, Sports physiotherapy, Rehabilitation, Hip extensors.

## INTRODUCTION

Muscle strain injuries are among the most common sports injuries observed in competitive athletes. Sprinting activities involve repetitive explosive hip extension, rapid acceleration, deceleration, and forceful lower limb muscle activation, which increase the risk of muscular injury. The gluteus maximus is one of the primary hip extensor muscles responsible for power generation during sprinting, jumping, and running activities.

Gluteal muscle strain commonly occurs due to excessive eccentric loading, muscular fatigue, inadequate warm-up, altered biomechanics, or sudden explosive movement. Athletes with gluteal strain frequently experience pain during sprinting, stair climbing, prolonged sitting, resisted hip extension, and high-speed running.

Early rehabilitation is essential to reduce pain, restore muscle strength, improve neuromuscular control, and prevent recurrence of injury. Progressive rehabilitation programs focus on phased recovery involving pain management, mobility restoration, muscle activation, strengthening, functional retraining, and gradual return-to-sport progression.

Sports physiotherapy plays an important role in optimizing recovery and improving athletic performance following muscular injuries. Evidence-based rehabilitation protocols can help athletes safely return to sports while minimizing risk of reinjury.

Therefore, this case study aimed to evaluate the effectiveness of a progressive rehabilitation program in a competitive sprinter with gluteus maximus strain.

## AIM

To evaluate the effectiveness of a progressive rehabilitation program in a competitive sprinter with gluteus maximus strain.

## OBJECTIVES

- To reduce pain using physiotherapy interventions.
- To improve gluteal muscle strength.
- To restore hip mobility and flexibility.
- To improve functional and sport-specific performance.
- To facilitate safe return to sprinting activities.
- To prevent recurrence of injury.

## CASE DESCRIPTION

A 21-year-old male competitive sprinter reported sudden onset pain over the left gluteal region during explosive sprint start training. The athlete complained of pain while sprinting, climbing stairs, and prolonged sitting.

Pain increased during resisted hip extension activities. The athlete also reported difficulty performing high-speed running and acceleration drills.

Ultrasound examination confirmed grade II gluteus maximus strain.

## CLINICAL FINDINGS

### Pain History

- Pain location: Left gluteal region.
- Nature of pain: Dull aching intermittent pain.
- Aggravating factors: Sprinting, stair climbing, resisted hip extension.
- VAS score: 6/10.

### Observation

- Slight antalgic gait.
- Pain during resisted hip extension.

- Limited hip extension range of motion.

**Palpation**

Tenderness was present over the gluteus maximus insertion.

**Examination**

Manual Muscle Testing demonstrated reduced hip extensor strength (MMT grade 3/5).

## DIFFERENTIAL DIAGNOSIS

- Gluteus maximus strain.
- Piriformis syndrome.
- Hamstring strain.
- Lumbar referred pain.

## METHODOLOGY

**Study Design**

Single case study.

**Study Duration**

8 weeks.

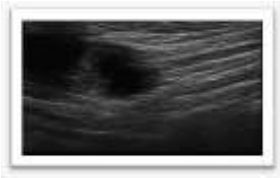
**Inclusion Criteria**

- Grade II muscle strain.
- Athlete aged 18–25 years.
- Willingness to participate in rehabilitation.

**Exclusion Criteria**

- Grade III muscle tear.
- Recent surgery.
- Neurological disorders.

## INTERVENTION PROGRAM



**Phase 1: Acute Phase (Week 1–2)**

**Goals**

- Reduce pain.
- Reduce inflammation.
- Protect injured tissue.

**Intervention**

- Rest and activity modification.
- Cryotherapy.
- Electrotherapy.
- Gentle pain-free range of motion exercises.
- Isometric gluteal activation.

**Phase 2: Activation Phase (Week 2–4)**

**Goals**

- Improve neuromuscular activation.
- Restore mobility.

**Intervention**

- Core activation exercises.
- Pelvic stabilization.
- Isometric strengthening.
- Gentle hip mobility exercises.

**Phase 3: Strengthening Phase (Week 4–6)**

**Goals**

- Improve muscular strength.
- Improve functional control.

**Intervention**

- Resistance band exercises.
- Hip extension strengthening.
- Functional lower limb strengthening.
- Balance and stability training.

**Phase 4: Return-to-Sport Phase (Week 6–8)**

**Goals**

- Restore sprint performance.
- Prevent recurrence.

**Intervention**

- Sprint drills.
- Agility exercises.
- Plyometric exercises.
- Sport-specific training.
- Progressive running program.

## OUTCOME MEASURES

**Visual Analogue Scale (VAS)**

Pain intensity was measured using the Visual Analogue Scale.

**Manual Muscle Testing (MMT)**

Hip extensor strength was assessed using Manual Muscle Testing.

**Functional Assessment**

Sport-specific sprinting and movement tests were performed.

## RESULTS

The athlete demonstrated significant improvement following the rehabilitation program.

**Pain Improvement**

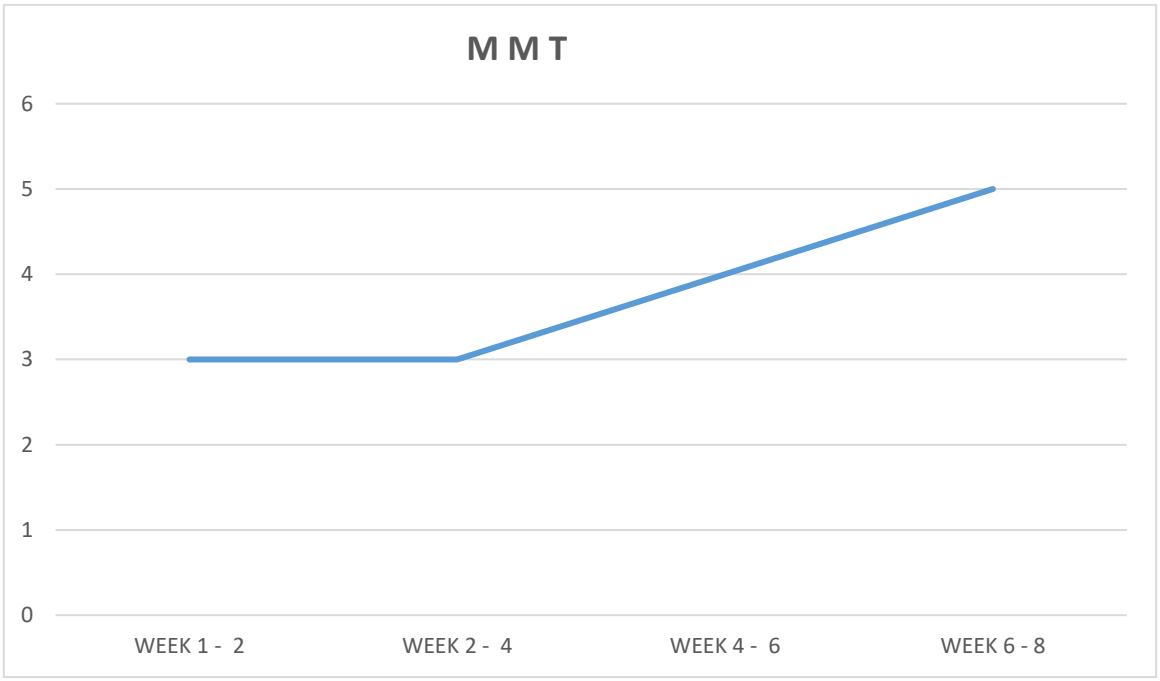
VAS score improved from 6/10 during initial assessment to 0/10 by week 8.

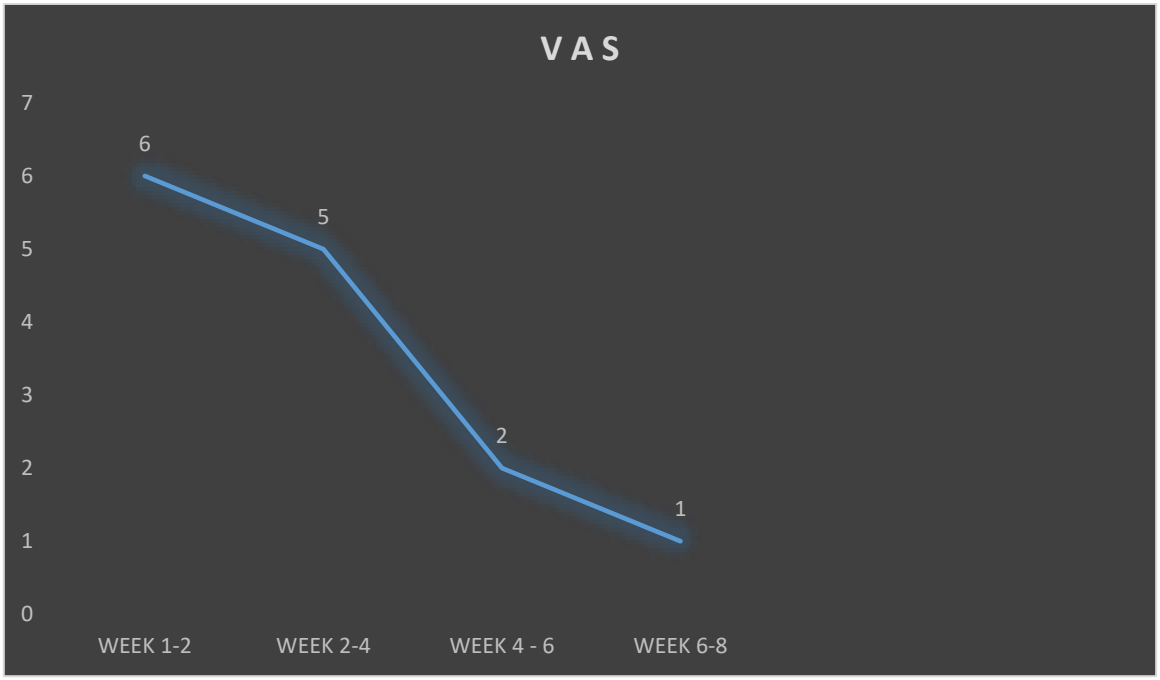
**Muscle Strength Improvement**

MMT improved progressively from grade 3/5 to 5/5.

**Functional Improvement**

The athlete demonstrated improved sprint mechanics, pain-free running, and improved sport-specific performance.



**DISCUSSION**

The present case study demonstrated that a progressive rehabilitation program effectively reduced pain and improved muscle strength and functional performance in a competitive sprinter with gluteus maximus strain.

The gluteus maximus is a primary hip extensor muscle responsible for generating power during sprinting and explosive athletic movements. During acceleration and sprint start phases, the gluteal muscles experience substantial eccentric and concentric loading. Excessive force production combined with inadequate recovery or biomechanical dysfunction may contribute to muscle strain injury.

The athlete in the present case demonstrated pain during sprinting, resisted hip extension, and stair climbing, indicating impaired hip extensor function and reduced muscular performance. Ultrasound examination confirmed grade II gluteus maximus strain.

Early rehabilitation focused on pain management, tissue protection, and reduction of muscular loading.

Cryotherapy, gentle mobility exercises, and activity modification helped reduce pain and inflammation during the acute stage.

As rehabilitation progressed, neuromuscular activation and core stabilization exercises were introduced to improve pelvic stability and gluteal muscle recruitment. Restoration of proper muscle activation is important for preventing compensatory movement patterns and improving lower limb biomechanics.

Strengthening exercises during the intermediate rehabilitation phase improved muscular force production and functional capacity. Progressive loading using resistance exercises helped restore gluteal strength and hip stability.

Sport-specific rehabilitation during the final phase allowed gradual reintroduction of sprint mechanics, acceleration drills, and plyometric exercises. Functional retraining is essential for athletes returning to high-speed sports activities because it improves movement efficiency and reduces reinjury risk.

The progressive improvement in VAS and MMT scores indicates successful rehabilitation and restoration of muscular performance. The athlete returned to sprint-specific activity without pain or functional limitation.

The findings of this case support previous sports rehabilitation literature emphasizing the importance of structured progressive loading, neuromuscular retraining, and sport-specific rehabilitation in management of muscle strain injuries.

One of the major strengths of the present rehabilitation program was the phased progression approach, which allowed safe recovery while minimizing reinjury risk.

However, as this was a single case study, generalization of findings is limited. Future studies should investigate larger athlete populations using objective biomechanical assessment and long-term follow-up.

## CONCLUSION

The structured progressive rehabilitation program effectively reduced pain and improved gluteal muscle strength, hip mobility, and functional performance in a competitive sprinter with gluteus maximus strain. The case highlights the important role of sports physiotherapy in muscle injury rehabilitation and safe return-to-sport progression.

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