**COMPETITOR:**
**JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA**
**e-ISSN: 2657-0734 & p-ISSN: 2085-5389** ‖ Volume 17, Number 1, 2025 ‖ P.099-104
**DOI**: 10.26858/cjpko.v17i1.71262

# Physiotherapy Management of Hamstring Strain with Ultrasound, Neuromuscular Taping (NMT), and Progressive Isometric Exercise: A Case Report

**Yose Rizal[1A-E*], Ruswita Putri[2B-D]**

[1,2]Physiotherapy Program, Faculty of Pharmacy and Health Sciences, Abdurrab University, Riau Province, Indonesia

yose.rizal@univrab.ac.id[1], 2311202005@student.univrab.ac.id[2]

## ABSTRACT

Hamstring strain is one of the most common injuries in sports, particularly in activities requiring sprinting and sudden acceleration. Effective physiotherapy intervention is essential to facilitate recovery, restore muscle function, and prevent recurrence. A 23-year-old male footballer presented with pain and tightness in the posterior thigh after a sprinting injury. The patient was diagnosed with a grade 2 hamstring strain and sought physiotherapy at Fisiohands Clinic, Pekanbaru, following an initial medical evaluation. The rehabilitation program included ultrasound therapy, neuromuscular taping (NMT), and progressive isometric exercises. Pain reduction, increased flexibility, and improved functional capacity were observed after four weeks of intervention. The patient underwent a structured four-week physiotherapy protocol, including pain management, mobility training, and strengthening exercises. Visual Analogue Scale (VAS), Goniometer and The Lower Extremity Functional Scale (LEFS) were used for evaluation. After four weeks, the patient demonstrated pain reduction (VAS 7 to 2), increased flexibility (45° to 78°), and improved functional performance (LEFS 30 to 65). These findings indicate that ultrasound, NMT, and isometric exercises are effective modalities in acute hamstring strain rehabilitation.

**ARTICLE HISTORY**
Received: 2025/01/23
Accepted: 2025/01/30
Published: 2025/02/25

**KEYWORDS**
Physiotherapy;
Hamstring Strain;
Ultrasound;
Neuromuscular Taping;
Isometric Exercise.

**AUTHORS' CONTRIBUTION**
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

**Cites this Article** : Rizal, Yose; Putri, Ruswita. (2025). Physiotherapy Management of Hamstring Strain with Ultrasound, Neuromuscular Taping (NMT), and Progressive Isometric Exercise: A Case Report. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 ( 1 ), p.099-104

## INTRODUCTION

One of the most frequent sports injuries is a hamstring strain, especially during exercises involving running, kicking, or abrupt movements. The main causes of these injuries are a lack of flexibility and excessive muscle rigidity. Injury to the hamstring muscle group is especially significant since it is essential for posture, pelvic alignment, and lower body movement (Cai et al., 2023).

The hamstring muscle complex consists of three primary muscles: the semitendinosus, semimembranosus, and biceps femoris. Hip extension and knee flexion

**Yose Rizal[1A-E*], Ruswita Putri[2B-D]**
yose.rizal@univrab.ac.id[1*]

are controlled by these muscles, which are found in the rear of the thigh. Additionally, they help stabilize the knee joint by preventing anterior tibial translation in concert with the anterior cruciate ligament (ACL) (Widodo et al., 2022).

Excessive tension on the muscle-tendon unit, frequently during high-intensity exercises like sprinting, jumping, or abrupt stopping, is the usual cause of hamstring injuries (Cai et al., 2023). High-velocity motions involving quick hip flexion or knee extension, repetitive microscopic muscle injury, overuse of muscles, and a deterioration in tissue integrity as a result of repeated stress can all cause these injuries (Kawai et al., 2021).

It is arguable whether a Hamstring Strain Injury results from a single aberrant event that pushes the boundaries of the muscle-tendon unit or from cumulative, recurrent microscopic muscle injury. The most frequent mechanism of Hamstring Strain Injury in sports is high-speed running, which is followed by actions that require extensive and forceful hamstring extension, such as kicking (Hickey et al., 2022). During sprinting, the hamstrings undergo an eccentric contraction during the late swing phase, reaching their maximum length. They are especially susceptible to strain injuries because of this (Cosio et al., 2023).

Depending on how severe it is, hamstring strain injuries are typically categorized as grade I–III strains. Fewer muscle fibres are usually impacted by a grade I strain, a large number by a grade II strain, and a complete tear of the muscle by a grade III strain (Wing & Bishop, 2020).

With an incidence rate of almost 29% among athletes, hamstring injuries are prevalent in professional sports. Younger athletes in professional soccer leagues usually miss an average of 21 days of play due to hamstring injuries, which are most common between the ages of 16 and 25 (Kawai et al., 2021). Nearly one-third of hamstring strains repeat within the first year of returning to sports, indicating a significant recurrence rate (Erickson & Sherry, 2017). Furthermore, within 25 days of starting to play again, almost 50% of athletes who have previously sustained hamstring injuries experience a recurrence (Soga et al., 2023).

Modifiable risk variables are frequently thought of as ones that can be decreased with a focused training intervention (e.g., boosting an athlete's strength). Nonmodifiable risk factors are those that the athlete and practitioner cannot control, such as the athlete's age (Wing & Bishop, 2020).

The long recovery period and increased risk of re-injury are two of the main problems with hamstring injuries. A protracted absence from sports is generally the result of recurrent injuries, which are frequently more serious than the first injury (Erickson & Sherry, 2017). Enhancing flexibility, strength, and neuromuscular control are the main goals for athletes seeking to treat hamstring problems. Ultrasound, neuromuscular taping (NMT), and isometric exercises are all useful tactics.

Ultrasound is a form of thermotherapy that uses an electric current that passes through a transducer that can expand and contract to create sound waves that can go through the skin and into the body to relieve both acute and chronic pain. The use of ultrasound occurs between 0.8 and 3 MHz (800 and 3,000 KHz).

**Yose Rizal[1A-E*], Ruswita Putri[2B-D]**
yose.rizal@univrab.ac.id[1*]

Neuromuscular Taping is one of the newest innovative biomechanical therapy methods in 2013. Applying neuromuscular taping can activate skin mechanoreceptors, which trigger nerve impulses when deformation is caused by mechanical loads such as pressure, touch, vibration, and stretching (Hargiani, 2019). The proper application of neuromuscular taping (NMT) can reduce pain and facilitate the passage of lymphatic fluid through skin folds. It is a process that entails placing elastic adhesive tape on the skin. The body moves as the tape is applied, causing the skin to wrinkle. These folds improve blood flow, posture, muscle and joint function, pain alleviation, and lymphatic drainage (Blow, 2012).

Isometric exercise is a type of static exercise where a muscle contracts and generates force without causing a noticeable change in muscle length or joint motion (Kisner & Colby, 2007). One common technique to improve hamstring strength is isometric workouts. Isometric exercises teach muscles to remain resistant to any force or circumstance. They offer a quick and easy method for strengthening the hamstring muscles, which can increase their power and resistance when exercising. The majority of hamstring injuries happen as a result of the muscles' inability to sustain force or generate the necessary amount of energy (Widodo et al., 2022).

## METHODS

This case report involves a 23-year-old male footballer diagnosed with grade 2 hamstring strain. The physiotherapy protocol was structured over four weeks, incorporating ultrasound therapy, neuromuscular taping (NMT), and progressive isometric exercises. The rehabilitation plan included pain management, muscle flexibility exercises, and progressive strengthening.

Outcome measures included pain assessment using the Visual Analog Scale (VAS), hamstring flexibility (goniometer measurements), and functional evaluation using the Lower Extremity Functional Scale (LEFS) score. Clinical assessments were conducted pre- and post-treatment to evaluate progress. This research was conducted at and approved by the Fisiohands Clinic.

### Case Presentation

A 23-year-old male footballer visited Fisiohands Clinic, Pekanbaru, with complaints of pain and tightness in the posterior thigh following a sprinting injury during a football match in October 2024. The patient was initially treated at a hospital, where a grade 2 hamstring strain was diagnosed. He later sought physiotherapy intervention to expedite recovery and regain functional capacity.

### Management and Outcome

The four-week rehabilitation program included:

a. Ultrasound therapy (3 MHz, 1.5 W/cm$^2$, continuous mode, 5 minutes) to stimulate deep tissue healing and enhance circulation, facilitating the repair of damaged muscle fibres.
b. Neuromuscular taping (NMT) is used with decompression techniques with a 45

**Yose Rizal[1A-E*], Ruswita Putri[2B-D]**
yose.rizal@univrab.ac.id[1*]

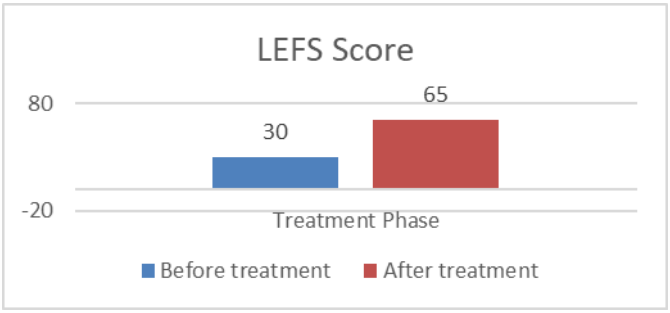
cm long Y cut to lessen discomfort, bruising, and swelling. In addition, using decompression techniques affects tissue oxygenation, which speeds up the recovery of injured muscle tissue.

c. Progressive isometric exercises, starting with low-intensity contractions and gradually increasing to moderate levels, to safely activate the muscle, prevent atrophy, and build foundational strength for later dynamic movements.

## RESULTS AND DISCUSSION

**Table 1.**
Changes in Clinical Parameters Before and After Intervention

| Parameter | Before Treatment | After Treatment |
|---|---|---|
| Pain (VAS, 0-10) | 7 | 2 |
| Hamstring Flexibility (°) | 45 | 78 |
| LEFS Score (0-80) | 30 | 65 |




**Graph 1.**
Improvement in LEFS Score After Intervention

The data presented in Table 1 and Graph 1 indicate a significant improvement in the patient's condition following four weeks of physiotherapy intervention. The reduction in pain from VAS 7 to 2 highlights the effectiveness of ultrasound, NMT, and isometric exercises in managing discomfort and inflammation. Furthermore, the increase in hamstring flexibility from 45° to 78° suggests that the applied interventions effectively improved the patient's range of motion, an essential factor in returning to sport and daily activities.

The functional recovery, as measured by the LEFS score, demonstrated remarkable improvement, increasing from 30 to 65. This substantial progression indicates that the combined treatment effectively restored muscular function and overall physical performance. The inclusion of progressive isometric exercises likely played a crucial role in strengthening the hamstring muscles while minimizing the risk of further strain.

Ultrasound delivers heat deep into the muscles, resulting in better flexibility of the collagen fibres and muscles. The therapeutic effects of ultrasound include relaxed joint contracture, better adhesion, and reduced joint stiffness, pain, and muscular rigidity (Cho & Kim, 2016).

Isometric training has been shown to alter physiological characteristics, such as

**Yose Rizal[1A-E*], Ruswita Putri[2B-D]**
yose.rizal@univrab.ac.id[1*]

muscle architecture, tendon stiffness and health, joint angle-specific torque, and metabolic activity. By performing a 70% maximal voluntary isometric contraction, study results show that a greater improvement in hamstring musculotendinous stiffness and increasing the loading strategy with a heavy slow resistance program was helpful to the proximal hamstring tendinopathy (Widodo et al., 2022).

Increasing hamstring flexibility or hamstring strength through exercise interventions increases optimal musculotendinous lengths of the hamstring muscles and, thus, decreases peak musculotendinous strains during sprinting for male athletes (Wan et al., 2021). Neuromuscular Taping (NMT) has also been found effective in increasing the flexibility of the Erector Spinae and hamstring muscles (Rizal et al., 2023).

Overall, the findings support the hypothesis that a structured rehabilitation program involving ultrasound, neuromuscular taping, and progressive isometric exercises significantly enhances recovery from hamstring strain. These results are consistent with previous research advocating for early-stage isometric activation and external support techniques to optimize muscle healing and function.

## CONCLUSION

This case report highlights the effectiveness of ultrasound, neuromuscular taping, and progressive isometric exercises in managing acute hamstring strain. These interventions led to significant pain reduction, increased flexibility, and improved functional performance.

Future studies should explore long-term rehabilitation effects and injury prevention strategies, particularly in athletic populations. Incorporating eccentric strengthening exercises and neuromuscular control training may further reduce reinjury risks.

## REFERENCES

Blow, D. (2012). *NeuroMuscular Taping: From Theory to Practice* (English Ed). Edi-Ermes Medical Publisher.

Cai, P., Liu, L., & Li, H. (2023). Heliyon Dynamic and static stretching on hamstring flexibility and stiffness : A systematic review and meta-analysis. *Heliyon*, *9*(8), e18795. https://doi.org/10.1016/j.heliyon.2023.e18795

Cho, S. H., & Kim, S. H. (2016). Immediate effect of stretching and ultrasound on hamstring flexibility and proprioception. *Journal of Physical Therapy Science*, *28*(6), 1806–1808. https://doi.org/10.1589/jpts.28.1806

Cosio, P. L., Moreno-Simonet, L., Porcelli, A., Lloret, M., Padulles, X., Padulles, J. M., Farran-Codina, A., & Cadefau, J. A. (2023). Assessment of inter-individual variability in hamstring muscle recovery after a sport-specific sprint training in women and men. *Frontiers in Physiology*, *14*, 1–12. https://doi.org/10.3389/fphys.2023.1331878

Erickson, L. N., & Sherry, M. A. (2017). Rehabilitation and return to sport after hamstring

strain injury. *Journal of Sport and Health Science*, *6*(3), 262–270. https://doi.org/10.1016/j.jshs.2017.04.001

Hargiani, F. X. (2019). Aplikasi Neuromuscular Taping Kasus Bell's Palsy Pada Pengalaman Praktek Fisioterapi dI Klinik Kineta Sidoarjo. *Jurnal Ilmiah Fisioterapi*, *2*(1), 10–14.

Hickey, J. T., Opar, D. A., Weiss, L. J., & Heiderscheit, B. C. (2022). Hamstring Strain Injury Rehabilitation. *Journal of Athletic Training*, *57*(2), 125–135. https://doi.org/10.4085/1062-6050-0707.20

Kawai, T., Takamoto, K., & Bito, I. (2021). Previous hamstring muscle strain injury alters passive tissue stiffness and vibration sense. *Journal of Bodywork and Movement Therapies*, *27*, 573–578. https://doi.org/10.1016/j.jbmt.2021.05.002

Kisner, C., & Colby, L. A. (2007). Therapeutic Exercise. In *Davis Company* (5th ed.). Davis Company.

Rizal, Y., Permata, A., Munir, R., Kurnia, T. S., & Sciences, H. (2023). *Effect of the Neuromuscular Taping ( NMT ) towards Flexibility Muscle Functions at the Lower Back and Hamstrings*. *8*(7), 777–779.

Soga, T., Yamaguchi, S., Inami, T., Saito, H., Hakariya, N., Nakaichi, N., Shinohara, S., Sasabe, K., Nakamura, H., Laddawong, T., Akiyama, K., & Hirose, N. (2023). Hamstring Activity Before and After Break-Point Angle Calculated By Smartphone Application During the Nordic Hamstring Exercise. *International Journal of Sports Physical Therapy*, *18*(6), 1290–1298. https://doi.org/10.26603/001c.89271

Wan, X., Li, S., Best, T. M., Liu, H., Li, H., & Yu, B. (2021). Effects of flexibility and strength training on peak hamstring musculotendinous strains during sprinting. *Journal of Sport and Health Science*, *10*(2), 222–229. https://doi.org/10.1016/j.jshs.2020.08.001

Widodo, A. F., Tien, C. W., Chen, C. W., & Lai, S. C. (2022). Isotonic and Isometric Exercise Interventions Improve the Hamstring Muscles' Strength and Flexibility: A Narrative Review. *Healthcare (Switzerland)*, *10*(5), 1–10. https://doi.org/10.3390/healthcare10050811

Wing, C., & Bishop, C. (2020). Hamstring strain injuries: Incidence, mechanisms, risk factors, and training recommendations. *Strength and Conditioning Journal*, *42*(3), 40–57. https://doi.org/10.1519/ssc.0000000000000538