



Physiotherapy management on sprain medial collateral ligament in sports injury: a literature study

Sergio Johan Putra¹, Lucky Anggiat^{1*}

ABSTRACT

Background: The risk of sports activities is injuries. There are two types of injury classification often experienced by athletes: acute trauma and overuse. The part of the body in sports that are quite common injuries due to body contact is the knee. Medial collateral ligament (MCL) injuries were one of the most common knee injuries in sports. The role of physiotherapy in MCL injury conditions is to improve knee conditions in athletes, prevent re-current of injuries, help heal the athlete's condition after MCL injury with existing modalities and help restore the condition, which aims to make the athlete able to return to play in their sport.

Methods: This study used library research which takes online and offline data sources to refer to books and scientific articles related to examination and physiotherapy intervention in the condition of MCL sprain injury.

Results: Physiotherapists must carefully examine every symptom that appears by examining the basic function of motion, palpation, specific test with a valgus stress test, and functional evaluation in conditions of MCL sprain injury.

Conclusions: In athletes, physiotherapy interventions must be graded, like reducing acute injury symptoms, exercising using tools, and reducing pain in the first phase; the second phase with increasing functional ability, flexibility, range of motion, and returning muscle strength; in the third phase, muscle strength must increase as before, returning agility, balance, and flexibility; furthermore, in the fourth phase, the athlete is prepared to return to sport with strength training, flexibility, agility, and sport-specific exercise.

Keywords: assessment, intervention, MCL sprain, physiotherapy.

Cite this Article: Putra, S.J., Anggiat, L. 2023. Physiotherapy management on sprain medial collateral ligament in sports injury: a literature study. *Physical Therapy Journal of Indonesia* 4(1): 12-13. DOI: [10.51559/ptji.v4i1.67](https://doi.org/10.51559/ptji.v4i1.67)

INTRODUCTION

The risk of sports activities is injuries. Injury is a disorder that occurs in the body that results in pain, heat, redness, swelling, and muscle dysfunctions, tendons, ligaments, joints, and bones due to excessive activity or accident (trauma).¹ Two types of injury classifications are often experienced by athletes, namely acute trauma and overuse. Acute trauma can be categorized as severe injuries, such as torn ligaments, muscles, tendons or sprains, or even fractures.² Acute injuries usually require professional care. Overuse injuries, or what is known as overuse syndrome, are also often experienced by athletes. It starts from the presence of excess strength, often used over a long time and repeatedly. But sometimes, this syndrome responds well to physiological tissue repair.^{3,4} The percentage of data shows that body contact is one of the most frequent factors causing sports injuries at 45% among soccer, rugby, and judo.³

The body part in sports that gets many injuries due to body contact is the knee. The knee joint comprises bones, muscles, ligaments, meniscus, joint capsule, nerves, and vascularization.^{5,6} The

knee has several joints, including the tibiofemoral, patellofemoral, and proximal tibiofemoral. Although the knee joint is well constructed, its function is often impaired when there is excessive knee movement or due to external contact of the knee.⁷ The knee joint is a joint that receives a large load with a wide range of motion (ROM), and functions as a shaper of posture, plays a role in weight transfer motion and in movements such as walking, running, jumping, kicking, pushing, pulling and so on.⁸

Injuries in the knee are usually caused by impact when falling, physical contact, or can also be caused by stopping and changing the direction of motion excessively in the direction of rotation and combined with valgus movements of the knee.⁹ Generally, medial collateral ligament (MCL) injuries are the most common knee injuries in sports.^{7,10}

MCL injuries are more common in contact sports, and male athletes have a greater risk factor.⁷ The medial Collateral Ligament is a static stabiliser of the knee and one of the strong ligaments attached to the medial meniscus and capsule.¹¹ Majewski et al. (2006) stated that knee injuries were included in 17,397 patients out of 19,530 sports injuries during

¹Physiotherapy Program, Faculty of Vocational Studies, Universitas Kristen Indonesia, Jakarta, Indonesia;

*Corresponding to:
Lucky Anggiat;
Physiotherapy Program, Faculty of Vocational Studies, Universitas Kristen Indonesia, Jakarta, Indonesia;
lucky.panjaitan@uki.ac.id

Received : 2023-02-20
Accepted : 2023-03-16
Published : 2023-03-29

ten years, and MCL sprains were associated with 7.9% of injuries, and football injuries were one of the causes of these injuries.¹² MCL sprain injuries are caused by two things, namely direct valgus pressure to the lateral side of the knee, and usually, this condition will be more severe. In addition, it is also caused by non-contact rotation.¹⁰

The role of physiotherapy in MCL sprain injuries is to improve the knee condition in athletes, prevent re-injury, help heal the athlete's condition after MCL injury by exercise and also using therapeutic modalities, and help restore the condition, which aims to make the athlete able to return to play and achievement.¹³ In treating MCL sprains, there are still many diverse treatments, so it is necessary to know the recommended physiotherapy treatment. This study aims to identify the examination, evaluation and types of physiotherapy interventions recommended for MCL sprains. The benefits of this study are expected to be a guide for physiotherapists in providing treatment for MCL sprain conditions.

METHODS

In this study, the library research method was used, which took online and offline data sources referring to books and scientific articles related to examination and physiotherapy interventions in the condition of MCL sprain injuries as data sources to answer the research objective. We used books as resources for this study to focus on basic things such as examination and evaluation. In the physiotherapy intervention, articles that

recommend physiotherapy for MCL sprain injuries are used, such as research articles and clinical guidelines. The keywords used are “MCL Injury assessment”, “Physiotherapy MCL injury”, and “MCL Rehabilitation Program”. The research we used was a narrative literature review, so the articles included in this study were only guidelines and books related to physiotherapy in MCL injury.

RESULT

After searching the literature, several books became a reference for the anatomy and mechanism of MCL injury. We also took a number of articles to be used as material for discussing physiotherapy programs in MCL injuries and other supported articles. All the existing literature is combined and becomes a recommendation that supports each other. Following are the details of the literature used (Table 1).

DISCUSSION

Overview of MCL sprain

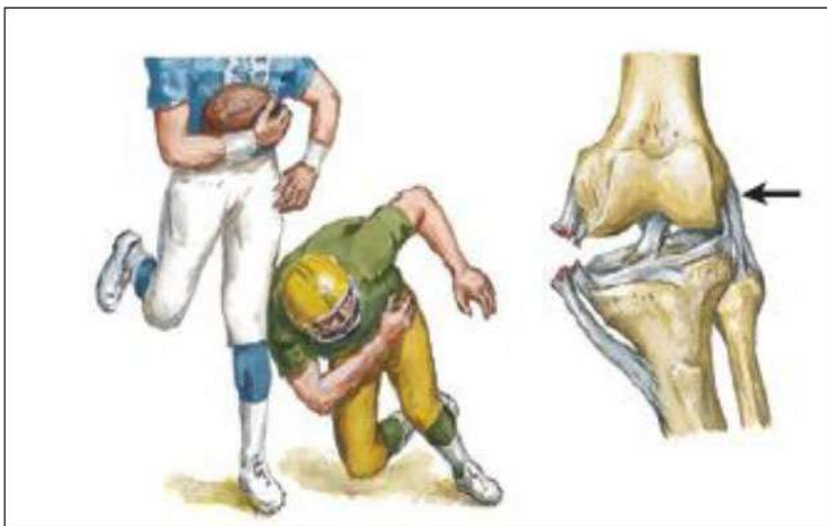
A sprain is a condition of pulling or tearing of soft tissues such as joint capsules and ligaments, graded as first (mild), second (moderate), or third (severe).¹⁴ A medial collateral ligament sprain is an injury to the medial (tibial) or medial capsule ligament.¹⁵ MCL sprain is one of the most common injuries that often occur in sports. It is important to know about this injury in terms of prevention, treatment and rehabilitation.¹⁰

Table 1. List of literature.

Authors (year)	Type of literature	Literature title
Kisner et al (2017)	Book	Therapeutic Exercise
Peterson & Renstrom (2017)	Book	Sports Injury Prevention Treatment and Rehabilitation
Roach et al. (2014)	Research Article	The Epidemiology of medial collateral ligament sprain in young athletes
Madden et al. (2010)	Book	Netter's Sports Medicine
DeLee (2010)	Book	Orthopaedic Sports Medicine Principles and Practice
Logerstedt et al. (2017)	Clinical Practice Guidelines	Knee stability and movement coordination impairments: Knee Ligaments sprain revision 2017
Dutton (2020)	Book	Dutton's Orthopaedic examination, evaluation, and interventions
Anderson et al. (2009)	Book	Foundation of Athletic Training: Prevention, Assessment and Management
Nyland et al. (2010)	Research Article	Update rehabilitation following ACL Reconstruction
Hughston (1994)	Research Article	The importance of the posterior oblique ligament in repairs of acute tears of the medial ligaments in knees with and without an associated rupture of the anterior cruciate ligament. Results of long-term follow-up.
Roos et al. (1998)	Research Article	Knee Injury and Osteoarthritis Outcome Score (KOOS)—development of a self-administered outcome measure
Tidball (2005)	Research Article	Inflammatory processes in muscle injury and repair
Janse van Rensburg & Nolte (2011)	Research Article	Sports injuries in adults: Overview of clinical examination and management
Anggiat (2021)	Research Article	Sports Rehabilitation Phases: A Literature Review
Jones & Wilson (2019)	Book	Everyday Sport Injuries: the essentials step-by-step guide to prevention, diagnosis, and treatment

Table 2. Classification of MCL Injury and its signs and symptoms.

Grade	Ligament Condition	Signs, symptoms and problematic
Grade 1	One-third of the ligament fibers are pulled	<ul style="list-style-type: none"> • Swelling • Local pain in the pulled ligament • Active and passive motion of the knee is still in normal but slightly decreased muscle strength. • Valgus stress test is positive with little pain.
Grade 2	Half or one-third of the ligament fibres are pulled followed by microtears.	<ul style="list-style-type: none"> • Local swelling and pain. • The pain is quite sharp and interferes with every movement. • The athlete feels unstable. • ROM begins to decrease followed by tension in the hamstring muscles. • Unable to full extension motion • Valgus stress test positive and moderately painful
Grade 3	Partial or complete ligament rupture.	<ul style="list-style-type: none"> • Swelling will be very visible large and intense pain. • Severe pain is felt but is present when it disappears for a moment. • Athletes feel a complete loss of joint stability. • ROM is completely reduced • Appears like subluxation.

**Figure 1.** The MCL Sprain Mechanism.

MCL sprain injuries are caused by a direct valgus blow to the lateral side of the knee, which usually makes the condition more severe. Then it can also be caused by non-contact rotation (Figure 1).²

Physical examination, specific test and functional evaluation on MCL sprain

A physical examination of the knee should be performed to identify and differentiate it from other associated knee injuries. In this case, in the condition of the MCL sprain injury, the main complaints in the patient are pain in the knee, swelling, and tension in the hamstring and quadriceps muscles. Sometimes there is a post-injury sensation like a “pop” sound sensation.^{16,17} In addition, palpation should be performed on the MCL sprain. 78% accuracy from palpation was obtained to determine the injury in the MCL condition.¹⁰ Palpation should also be performed to identify other pathologies of the knee.

In addition, the physical examination also begins with assessing the active range of motion (ROM), active motion pain, and muscle strength or MMT (manual muscle testing).¹⁶ Furthermore, passive motion examinations were carried out, such as assessing the passive range of motion, pain, and end feel. When performing these two examinations, it is generally found that active and passive knee motion is limited to flexion and extension.¹⁸

The specific test recommended for MCL sprain is the valgus stress test.^{16,19} The valgus stress test procedure should also be performed at 0° and 30° flexion of the knee joint and compared with the other knee (Figure 2).² If the injury is more severe, it can involve several ligaments of the knee, such as the anterior cruciate ligament, meniscus, and posterior cruciate ligament. Follow-up medical examination with MRI can also be performed to evaluate and measure rotational instability, especially if there are other signs and symptoms, such as traction of the Anterior Cruciate Ligament.²⁰ The signs and symptoms of ligament sprains that also guide MCL sprains, in general, can be seen in Table 2. Athletes cannot be moved around in acute conditions without using assistive devices (sticks or stretchers). Furthermore, if a complete tear occurs, the athlete stops returning to their sports activity before further treatment.¹⁴

Functional evaluation can be performed on MCL strain conditions using the Knee Injury and Osteoarthritis Outcome Score (KOOS).^{16,21} The KOOS questionnaire is designed to obtain relevant results for patients in the short and long term after suffering a knee injury. Instructions for scoring the five patient dimensions relevant to KOOS were scored separately. The pain was divided into nine assessment items, symptoms into seven items, daily activities into seventeen assessment items,

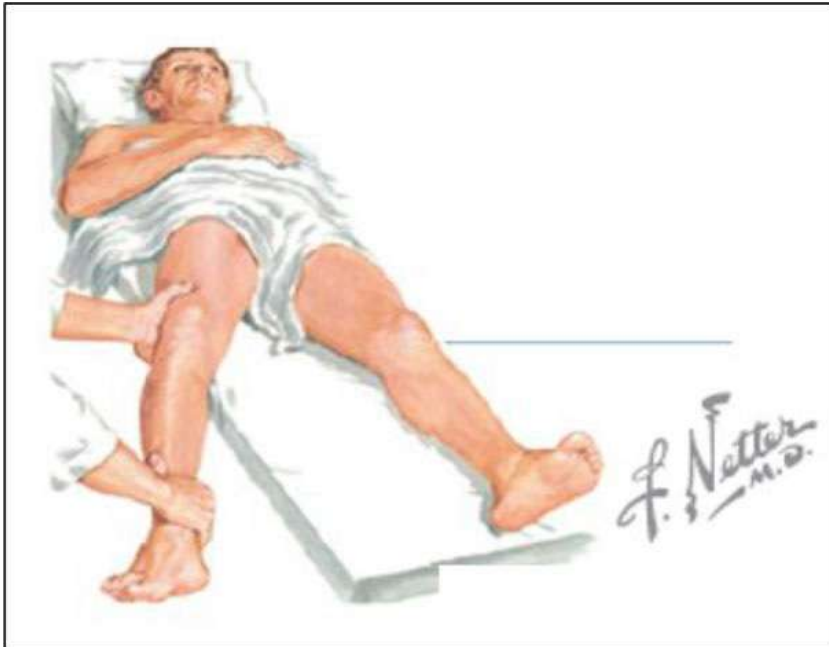


Figure 2. Valgus Test.



Figure 3. Examples of adductor isometric exercises, patellar mobilization and Active SLR (personal documentation).

sport and recreation function into five assessment items, and quality of life into four assessment items. A Likert scale was used; all items had five possible answer options scored from zero (no problem) to four (extreme problem), and each of the five scores

was counted as the sum of the items included. The interpretation of the score was changed to a scale of 0-100, with zero representing minimal knee problems and 100 having unusual knee problems on the scale of the orthopaedic and generic measures. A score between 0-100 represents the percentage of the total score that can be achieved.

Soft tissue healing phase in the condition of MCL sprain

MCL is included in the extra-articular soft tissues with physiological healing abilities.^{18,19} Soft tissue healing, which also occurs in the MCL, occurs in three stages: inflammation, proliferation, and maturation.

Inflammatory phase

Degeneration and inflammation occur in the first few days following injury. This process is initiated because of the destruction of the sarcolemma. An unregulated influx of calcium then occurs in the injured sarcolemma. The excessive amount of calcium in the cytoplasm causes protease and hydrolase enzymes to be activated, damaging ligament cells and activating various enzymes that encourage the production of mitogenic substances for ligament cells and immune cells.²² In this phase, there are also known signs of inflammation, such as redness, local heat, swelling, pain, and in some severe cases, loss of mobility.¹⁹

Regeneration and repair or proliferation phase

The proliferative phase begins in the first 3–5 days after injury and peaks after 3–6 weeks. Then it will gradually decrease in 3–4 weeks after the damage. In the proliferation phase, there is the formation of new blood vessel tissue (angiogenesis), the formation of fibrous tissue (fibroplasia), then the formation of new epithelial tissue (Re-epithelialization) and finally, contractures in wound tissue (wound contraction).¹⁹

The remodeling or maturation phase

The third phase in soft tissue healing is the remodeling process, known as the maturation phase. This phase starts about 2–3 weeks after the injury and can last up to 1 year or more. This phase aims to produce the maximum tensile strength of the ligamentous cells through reorganization, degradation, and resynthesis of the extracellular matrix.¹⁹ This phase is characterized by the formation of mature muscle cells with changes in the extracellular matrix, resolution of the initial inflammation, and reorganization of fibrous connective tissue and tissue contraction.²³



Figure 4. Examples of “close-chain” exercises, balance exercises, stability exercises, and flexibility exercises (personal documentation).

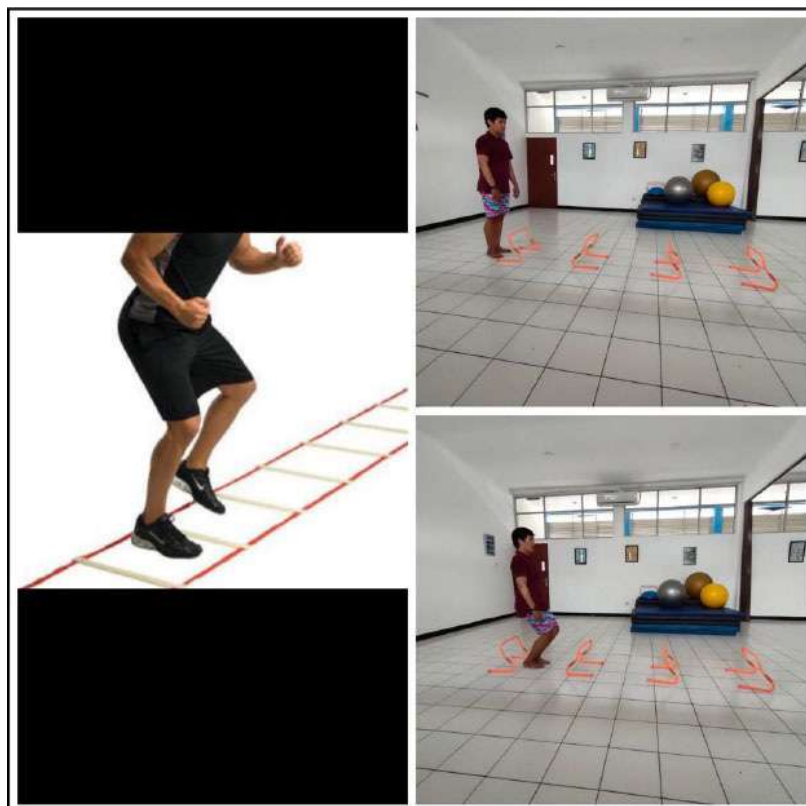


Figure 5. Examples of running drills exercises with resistance and advanced agility training (personal documentation).

General physiotherapy interventions on MCL sprain in athletes

In general, the physiotherapy interventions in the rehabilitation process in the condition of the MCL sprain, i.e., if it is in a sprained condition in an acute condition with a partial or complete knee ligament tear, it can be treated conservatively with rest, joint protection, and exercise.^{4,24} After the acute stage, continued the healing stage with exercises. Exercise should also be directed to restore normal joint range of motion, balance, normal gait patterns, strength, endurance, and neuromuscular muscle control that supports dynamic joint stability during functional activities.^{6,24} In particular, in sports physiotherapy, several phases can be carried out in implementing physiotherapy interventions at the stages of MCL injury recovery.^{6,16,19} All physiotherapy programs are described as follows.

The first phase (1-3 weeks)

The goals of the rehabilitation program in the first phase are to protect healing tissue, prevent inhibition of muscle movement, reduce joint swelling and pain, and plan a home exercise program for the patient. Interventions that can be carried out are: In acute conditions, protective bracing, restrict activity, ice, compression, and elevation (PRICE) may be performed; Ambulation exercises using sticks using crutches with minimal loading or as tolerated; Passive and active exercise range of motion of the joints to the extent of pain such as heel slides, prone knee flexion assisted by a healthy foot; Patellar mobilization grades I and II. To avoid the occurrence of adhesions of fibrotic tissue on the patella; Isometric exercise on quadriceps, back, and adductor muscles; Active SLR exercises or exercises to lift the legs, with the patient sleeping in a supine position; Aerobic exercises such as cycling if the range of motion (ROM) has started to increase. Some programs are depicted in [Figure 3](#).

The second phase (3-6 weeks)

The aim of rehabilitation in the second phase is to increase the full range of motion of the joints, improve normal walking patterns without the help of tools, increase muscle strength, and return to daily activities. The patient is expected to adhere to the home exercise program. Some programs are displayed in [Figure 4](#). Interventions that can be carried out during this phase are Isometric exercises with various joint angles with the addition of ROM (flexion and extension of the knee as well as adduction and abduction of the hip); Progressive loading exercises with pain tolerance such as the use of weights on the ankles and performing knee flexion and extension movements and hip

abduction and adduction; Close-chain exercises like squatting, steps up and downs, lateral step-ups; Lower extremity flexibility exercises, such as active stretching of the hamstring and quadriceps muscles; Endurance exercise by bicycle or swimming; Balance exercises; Stabilization exercises; Exercise by walking or jogging at the end of the exercise program in this phase; At the last week of this phase, we can start with specific skill exercises at the end of this phase (sports specific exercises).

The third phase (5-8 weeks)

The goals of rehabilitation in this phase are to increase muscle strength, increase endurance, improve neuromuscular control and increase control. Interventions that can be carried out at this phase are Lower limb flexibility exercises such as active dynamic stretching on the hamstring and quadriceps muscles. It can also be added to hip abduction and adduction movements; Progressive weight training with leg press and hamstring curl with adjusted loading; Close-chain exercises; Exercise with balance with increased balance disturbance; Advanced endurance training such as pool running and swimming; Isokinetic exercise (if available); Continuous common training program such as jogging, running at full speed and running in a zigzag pattern.

The fourth phase (8-12 weeks)

The goals of this phase of rehabilitation are to increase strength, increase power, increase endurance, restore maximum functional ability and transition to a specific exercise training program (Figure 5). Interventions that can be carried out at this phase are: Continue the flexibility and reinforcement as in phase three; Advanced agility exercises such as running drills (run like a figure eight, cross over steps (Carioca exercise), jump on two feet and move from side to side; Plyometric exercises such as combined jumping, bounding and skipping; Apply specific sports exercises according to the needs of the Athlete; Ensure the need for joint protection before returning to sports activities.

This research is a simple literature review research. The researcher realizes that this research still needs to be improved and that more systematic research needs to be done using other methods. The use of the results of this study also needs to be careful not to give the wrong perception.

CONCLUSIONS

From the results and discussion obtained, physiotherapists must carefully examine every sign of symptoms that arise by examining basic

functional movements (active and passive movements), palpation, a specific test with the valgus stress test, and functional evaluation on the condition of the MCL sprain injury.

In athletes, the need for intervention differs from that in general patients. Interventions should be gradual, from the symptomatic reduction of acute injury, exercise using assistive devices, and pain reduction in phase one. Then the second phase was continued: increasing functional ability and flexibility, increasing ROM, and restoring muscle strength. In phase three, muscle strength must return to normal, restoring agility, balance, and flexibility. Furthermore, in phase four, the athlete prepares to return to their sport with strength, flexibility, agility, and athlete-specific sports training.

CONFLICT OF INTEREST

No conflict of interest in this study.

FUNDING

None.

AUTHOR CONTRIBUTIONS

SJP, collected data and prepared the literature; LA, conceived the study design, selected literature, and formatted the article.

ETHICS CONSIDERATION

This study reviewed the previous literature. Thus this study does not need to obtain ethical clearance.

REFERENCES

- Mueller-Wohlfahrt HW, Haensel L, Mithoefer K, et al. Terminology and classification of muscle injuries in sport: the Munich consensus statement. *Br J Sports Med.* 2013;47(6):342-350.
- Madden CC, Putukian M, Young CC, McCarty EC. *NETTER'S SPORTS MEDICINE.* (1, ed.). Elsevier Inc; 2010.
- Setiawan A. Faktor timbulnya cedera olahraga. *Media Ilmu Keolahragaan Indones.* 2011;1(1).
- Janse van Rensburg DC, Nolte K. Sports injuries in adults: Overview of clinical examination and management. *South African Fam Pract.* 2011;53(1):21-27. doi:10.1080/20786204.2011.10874055
- Thompson JC. *Netter's Concise Orthopaedic Anatomy E-Book.* Elsevier Health Sciences; 2015.
- Jones G, Wilson E. *Everyday Sport Injuries: The Essentials Step-by-Step Guide to Prevention, Diagnosis, and Treatment.* DK Publishing; 2019.
- Phisitkul P, James SL, Wolf BR, Amendola A. MCL injuries of the knee: current concepts review. *Iowa Orthop J.* 2006;26:77.
- Higgins M. *Therapeutic Exercise: From Theory to Practice.* FA Davis; 2011.

9. Hyde TE, Gengenbach MS. *Conservative Management of Sports Injuries*. Lippincott Williams & Wilkins; 1997.
10. Roach CJ, Haley CA, Cameron KL, Pallis M, Svoboda SJ, Owens BD. The epidemiology of medial collateral ligament sprains in young athletes. *Am J Sports Med*. 2014;42(5):1103-1109.
11. Silva LPD, Desai C, Loureiro N, Pereira H, Espregueira-Mendes J. Knee Medial Collateral Ligament. *Footb Traumatol New Trends*. Published online 2015:127.
12. Majewski M, Susanne H, Klaus S. Epidemiology of athletic knee injuries: A 10-year study. *knee*. 2006;13(3):184-188.
13. Kementerian Kesehatan Republik Indonesia. *Peraturan Menteri Kesehatan Republik Indonesia Nomor 65 Tahun 2015 Tentang Standar Pelayanan Fisioterapi*. Vol 16.; 2015.
14. Kisner C, Colby LA, Borstad J. *Therapeutic Exercise: Foundations and Techniques*. Fa Davis; 2017.
15. Peterson L, Renstrom P. *Sport Injuries Prevention Treatment and Rehabilitation*. Vol 110. Taylor & Francis Group; 2017.
16. Logerstedt DS, Scalzitti D, Risberg MA, et al. Knee stability and movement coordination impairments: Knee ligament sprain revision 2017. *J Orthop Sports Phys Ther*. 2017;47(11):A1-A47. doi:10.2519/jospt.2017.0303
17. DeLee J. DeLee & Drez's Orthopaedic Sports Medicine Principles and Practice, ; Saunders. Published online 2010.
18. Dutton M. *Dutton's Orthopaedic Examination, Evaluation, and Intervention*. Fifth Edit. McGraw-Hill Educatio; 2020.
19. Anderson MK, Parr GP, Hall SJ. *Foundations of Athletic Training: Prevention, Assessment, and Management*. Lippincott Williams & Wilkins; 2009.
20. Nyland J, Brand E, Fisher B. Update on rehabilitation following ACL reconstruction. *Open Access J Sport Med*. Published online 2010:151. doi:10.2147/oajsm.s9327
21. Roos EM, Roos HP, Lohmander LS, Ekdahl C, Beynnon BD. Knee Injury and Osteoarthritis Outcome Score (KOOS)—development of a self-administered outcome measure. *J Orthop Sport Phys Ther*. 1998;28(2):88-96.
22. Tidball JG. Inflammatory processes in muscle injury and repair. *Am J Physiol Integr Comp Physiol*. 2005;288(2):R345-R353.
23. Järvinen TAH, Järvinen TLN, Kääriäinen M, Kalimo H, Järvinen M. Muscle injuries: Biology and treatment. *Am J Sports Med*. 2005;33(5):745-764. doi:10.1177/0363546505274714
24. Anggiat L. Sports Rehabilitation Phases: A Literature Review. *Int J Med Exerc Sci*. 2021;7(3):1097-1102. doi:10.36678/IJMAES.2021.V07I03.008



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