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REVIEW ARTICLE

SPORTS REHABILITATION PHASES: A LITERATURE REVIEW

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ABSTRACT

Background: Physiotherapists must have precise and accurate clinical decisions when dealing with an injured athlete because they must return to their sport activities as their job. The selection of the right intervention in the sports rehabilitation phase will certainly give good results to the athlete. This study aims to serve as a general guideline for the stages of exercise rehabilitation carried out by physiotherapists with the selection of appropriate physiotherapy interventions. **Methods:** This study is a literature review study that took sources from online and offline literature. The literature in form of books and journal articles that discuss the sport rehabilitation phase. **Results:** From the search results, there are not many books and articles that specifically stated that there are phases in sports injury rehabilitation. Some sources are still more specific in a case or only show interventions that can be an option in the application of sports injury management regardless of phase. However, there is also some literature, mostly books, showing the application of progressive programs in sports injury rehabilitation in four phases. **Conclusion:** In conclusion, the phase of sport rehabilitation carried out by a physiotherapist must have a clear stage based on the examination and the needs of the athlete. Typical sports rehabilitation phases are phases one to four with a focus on reducing pain in phase 1, increasing flexibility in phase 2, returning and increasing strength, endurance, agility, balance and proprioception in phase 3 and returning to sports in phase 4.

Keywords: Sport, Rehabilitation Phase, Intervention, Physiotherapy

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INTRODUCTION

Musculoskeletal disorders are the most common conditions faced by physiotherapists in their practice¹. Musculoskeletal injuries are similar to sports injuries². In physiotherapy, in general, physiotherapists have several stages to provide intervention³. As in musculoskeletal injuries, the physiotherapist will provide a program that aims to reduce pain, increase range of motion, and then return the patients to their activities⁴.

In contrast to sports injury conditions, in addition to what has been explained for musculoskeletal injuries, the physiotherapist must have the goal of returning the athletes to their sport activities⁵. This is a challenge for the physiotherapist and must really decide clinically and gradually from the onset of the injury to returning to sport activities⁶.

Physiotherapists must have precise and accurate clinical decisions when dealing with an injured athlete because they must return to their sport activities as their job². The selection of the right intervention in the sports rehabilitation phase will certainly give good results to the athlete⁶.

Seeing the amount of literature discussing the handling of physiotherapy in sports conditions, it is necessary to have a guide that can be used by physiotherapists in general in providing interventions for sports injuries. This study aims to serve as a general guideline for the stages of exercise rehabilitation carried out by physiotherapists with the selection of appropriate physiotherapeutic interventions.

METHOD

This study is a literature review study that took sources from online and offline literature. The literature is in form of books and journal articles that discuss the sport rehabilitation phase. Articles taken are specifically to review articles that describe the phases of sports rehabilitation in general. A case-specific exercise rehabilitation study was not included as a result. The search was conducted using the keywords 'sport physio phase' and 'sport rehab phase' or 'sport physiotherapy phase' and 'sport rehabilitation phase'. However, the method used is not a systematic review research method because there is not much literature available. The online database used in the search only uses Google Scholar as one of the largest research databases. While the book used is a book about showing the theoretical concepts progressive phase of sport injury rehabilitation.

RESULTS AND DISCUSSION

From the search results, there are not many books and articles that specifically stated that there are phases in sports injury rehabilitation^{5,7,8}.

Some sources are still more specific in a case or only show interventions that can be an option in the application of sports injury management regardless of phase⁹⁻¹². However, there is also some literature, mostly books, showing the application of progressive programs in sports injury rehabilitation in four phases¹³⁻¹⁷.

Literature is related to the sports rehabilitation phase summarized in table 1. The results are summarized in the stages of phase 1 to Phase 4. Table 2 can be seen as a summary of the discussion.

Authors	Type of Literature	Sports Rehabilitation Phase	Details of Sport Rehabilitation phase
Bomgardner, R (2001)	Research Article	Four Phase	Phase I: Immobilization Phase II: Range of Motion Phase III: Strength Phase IV: Return to Activity
Caparrós, et al. (2017)	Research Article	Three Phase	Phase I: Early Mobilization Phase II: Increase Functional, Intensity and Load Phase III: Reach Competition level intensity and loading under training condition
Dhillon et al. (2017)	Research Article	Four Phase	Phase I: Acute Phase: Promote tissue healing and avoid deconditioning Phase II: Reconditioning phase Phase III: Return to sport Phase IV: Prevention of reinjury
Futrell & Rozzi, (2019)	Research Article	Four Phase	Phase I: Acute Injury phase Phase II: Inflammatory Phase Phase III: Motion Phase Phase IV: Strength and Function phase
Hyde & Gengenbach (1997)	Book	Four Phase	Phase I: Control collateral damage by limiting swelling, soft tissue injury and atrophy. Phase II: Increasing Range of motion and strength Phase III: Improving strength Phase IV: Return of the athlete to play and maintenance of strength and flexibility gains
Anderson et al. (2009)	Book	Four Phase	Phase I: Control Inflammation Phase II: Restore Motion Phase III: Develop muscular strength, Power, and Endurance Phase IV: Return to Sport/Activity
Comfort & Abrahamson (2010)	Book	Four Phase	Phase I: Inflammation and Pain management Phase II: Range of motion and Flexibility Phase III: Strength endurance and maximal strength Phase IV: Power (Plyometric Training)
Joyce and Lewindon (2016)	Book	Three Phase	Phase I: Acute Rehabilitation Phase II: Progressive Loading Phase III: Return to training and performance
Jones & Wilson (2019)	Book	Four Phase	Phase I: Early stage Phase II: Intermediate Stage Phase III: Advanced Stage Phase IV: Return to sport

Table 1. List of Literature

Phase 1

In this phase, physiotherapists need to pay attention to complaints that arise in athletes, such as pain or inflammation in muscle. Physiotherapists should focus on providing interventions in the form of pain reduction and if they do occur can also provide interventions to reduce tissue inflammation^{3,12}.

In addition, in this phase, attention is also paid to the ability to move in the range of motion (ROM) of the injured joint so that it does not decrease or be disturbed. Furthermore, it is also necessary to pay attention to cardiovascular conditions along with the condition of other parts of the body that are not injured in order to maintain their function and ability^{13,14,17}.

Some research reports related to a case of sports injury also supports this theory. In the research, the initial focus of physiotherapy was on reducing pain and maintaining ROM so that it did not decrease significantly^{9,10,12}.

Interventions that can be given in this phase include the use of compresses for acute conditions, electrophysiology modalities, manual therapy for pain reduction (joint mobilization grade I-II), massage or relaxation therapy and exercise therapy with the aim of reducing pain such as isometric contraction and stretching exercises^{3,13,14}.

Phase 2

Continue to the second phase, the physiotherapist must identify the patient's condition well in order to determine the appropriate intervention. In the second phase, the athlete's condition must have begun to show changes such as increased ROM, reduced pain and started to be able to move the injured

body for daily activities^{7,8}. The physiotherapist's focus on intervention should aim to restore ROM to 70-80 of normal^{13,14}. Pain reduction also needs to be considered, so that the implementation of the intervention can also be carried out. Moreover, the physiotherapist must stimulate the ability of the muscle tissue to contract perfectly^{8,10}.

Interventions that can be done include manual therapy/joint mobilization aimed at increasing ROM (Grade III-V) as well as exercise therapy such as contract-relax and stretching exercises^{14,18}.

Then, progress to initial strengthening exercises such as isometric exercises with weights, isotonic exercises with light weights (minimum) or body weights, proprioceptive exercises, and closed kinetic chain exercises⁵. This includes other exercises aimed at the body parts that are not injured, such as aerobics and strengthening exercises. It aims to keep the body parts that are not injured remain in good condition^{13,16}.

Several previous studies also support this theory, where after pain subsides and ROM begins to improve, it should be started with exercises that lead to early and proprioceptive muscle strengthening^{9,10,12}.

Phase 3

Then in phase three, where in this phase the patient is expected to no longer or at least feel pain¹⁴. In fact, it must be ensured that the ROM condition of the joint affected by the injury no longer has impaired flexibility or ROM¹⁵. In other words, the physiotherapists must ensure by their examination that the athlete is free or has minimal interference with the movement and function of the injured body¹³.

This phase is the initial phase of strengthening the injured muscle and restoring the ability of muscle contraction to normal. In this phase the physiotherapist is expected to focus on intervention in the form of strengthening exercises with progressive loads from 70-80 Maximum Reps^{14,18}. However, the load given needs to be adjusted to the condition of the injury and its area. Furthermore, training in the form of advanced proprioceptive exercises, balance, and coordination exercises and open kinetic chain exercises can be started for athletes. Movement patterns in sports that athletes are engaged in can also be patterns of strengthening exercises^{13,14}.

When strength has begun to improve, the physiotherapist can also consider plyometric exercises that suit the athlete's needs^{14,17}. Thus, the agility, speed, and endurance abilities of athletes begin to emerge. The exercise is also expected to coordinate the injured body part with the uninjured.

Phase 4

This phase is the last phase of exercise rehabilitation by a physiotherapist. The physiotherapist will focus more on strengthening the muscles, balance, agility, strength, and endurance of the athlete in order

to return to sport activities. Physiotherapy interventions that can be carried out are generally strengthening exercises with a maximum total load of repetitions (RM), advanced plyometric exercises, cardiovascular and musculoskeletal endurance exercises, as well as specific exercises from the athlete's sport when they train with the coaching team^{8,19}. Physiotherapists must monitor athletes for other complaints that may arise when training returns to sports so that they can provide advice and tools to support the athlete's sports skills^{5,14,17}.

Furthermore, at this stage, return to sport (RTS) testing needs to be carried out^{8,11}. Physiotherapists with their abilities can examine athletes according to their sport and based on clinical examination. A coach or sports scientist at a sports club can participate with a physiotherapist to determine whether the athlete can return to their sport activities or not^{12-14,20}.

Phase	Aim	Type of Intervention (Example)
Phase I	Inflammation control and/or pain Management	PRICE (Protect, Restrict activity, Ice, Compression, and Elevation). Electrophysical modalities Joint Mobilization Grade I-II Massage Therapy Isometric exercises Stretching Aerobic exercise in the area where there is no injury.

Phase II	Restoring Range of Motion (Flexibility)	Electrophysical modalities (If needed) Grade III-V . joint mobilization Active Exercise Contract Relax Exercise without or with Minimal Resistance/Loading Closed Kinetic Chain Exercise Stabilization Exercise
Phase III	Increase muscle strength, endurance, agility, etc	Muscle strengthening exercises with progressive weights on the injured part Open kinetic chain exercise Endurance Training Start basic agility/plyometric exercises for sports such as running, squats and more
Phase IV	Return to Sports/ Physical Activity	Continue flexibility and strengthening Advanced agility/dexterity/power training such as plyometrics Advanced running training with added resistance Apply specific sports exercises according to the athlete's needs Ensure the need for protective body parts / joints before returning to sports activities. Return to sport Testing

Table 2. Phase of Sport Rehabilitation

Time Stages and Variations

The time stages of sports rehabilitation by physiotherapists are relatively different in some injured body parts, so they cannot be equated or used as a guide^{3,5}. However, what the physiotherapist needs to understand is the theory of tissue healing time (both bone and muscle) to be a reference for the physiotherapist to determine the rehabilitation time^{3,21,22}. Progressive time and training load will be very different for each individual athlete and also different in the injured part so they really have to pay attention to the examination before giving physiotherapy intervention to the next stage^{14,19}.

There are many variations of rehabilitation phases in the world of physiotherapy practice, but from the author's point of view, the basic concept still refers to the stages that are adapted to the athlete's condition. Starting from pain reduction, increased flexibility, increased strength, and then back to sports^{5,20,23}.

This research is a literature search by the author, so it is important to make more comprehensive research in the future.

CONCLUSIONS

In conclusion, the phase of sport rehabilitation carried out by a physiotherapist must have a clear stage based on the examination and the

needs of the athlete. Typical sports rehabilitation phases are phases one to four with a focus on reducing pain in phase 1, increasing flexibility in phase 2, returning and increasing strength, endurance, agility, balance and proprioception in phase 3 and returning to sports in phase 4.

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Compliance with Ethics: This study based on review of previous literature, so no need to obtain the ethical clearance.

REFERENCES

1. Sephton R, Hough E, Roberts SA, Oldham J. Evaluation of a primary care musculoskeletal clinical assessment service: A preliminary study. *Physiotherapy*. 2010; 96(4): 296-302. doi:10.1016/j.physio.2010.03.003.
2. Grant ME, Steffen K, Glasgow P, Phillips N, Booth L, Galligan M. The role of sports physiotherapy at the London 2012 Olympic Games. *Br J Sports Med*. 2014;48(1):63-70. doi:10.1136/bjsports-2013-093169.
3. Futrell M, Rozzi SL. Principles of Rehabilitation. *Prim Care - Clin Off Pract*. 2020; 47(1); 87-103. doi:10.1016/j.pop.2019.10.004.
4. Wyss JF, Patel AD. Therapeutic Programs for Musculoskeletal Disorders. *Demos Medical Publishing*; 2013. doi: 10.1016/B978-0-323-39055-2.00012-7.
5. Caparrós T, Pujol M, Salas C. General guidelines in the rehabilitation process for return to training after a sports injury. *Apunt Med l'Esport*. 2017; 52(196) ; 167-172. doi: 10.1016/j.apunts.2017.02.002.
6. Bulley C, Donaghy M. Sports physiotherapy competencies: The first step towards a common platform for specialist professional recognition. *Phys Ther Sport*. 2005; 6(2); 103-108. doi:10.1016/j.ptsp.2005.02.002.
7. Bomgardner R. Rehabilitation Phases and Program and Program Design for the Injured Athlete. *Strength Cond J*. 2001;23(6); 24-25.
8. Dhillon H, Dhillon S, Dhillon MS. Current Concepts in Sports Injury Rehabilitation. *Indian J Orthop*. 2017; 51(5); 529-536. doi: 10.4103/ortho.IJOrtho.
9. Day JM, Lucado AM, Uhl TL. A Comprehensive Rehabilitation Program for Treating Lateral Elbow Tendinopathy. *Int J Sports Phys Ther*. 2019; 14(5); 818-829. doi: 10.26603/ijsp20190818.
10. Malliaras P, Cook J, Purdam C, Rio E. Patellar tendinopathy: Clinical diagnosis, load management, and advice for challenging case presentations. *J Orthop Sports Phys Ther*. 2015; 45(11); 887-898. doi:10.2519/jospt.2015.5987.
11. Hudson Z. Rehabilitation and return to play after foot and ankle injuries in athletes. *Sports Med Arthrosc*. 2009; 17(3) ; 203-207. doi:10.1097/JSA.0b013e3181a5ce96
12. Filbay SR, Grindem H. Evidence-based recommendations for the management of anterior cruciate ligament (ACL) rupture. *Best Pract Res Clin Rheumatol*. 2019; 33(1); 33-47. doi: 10.1016/j.berh.2019.01.018.
13. Anderson MK, Parr GP, Hall SJ. Foundations of Athletic Training : Prevention, Assessment, and Management. *Lippincott Williams & Wilkins*; 2009.
14. Jones G, Wilson E. *Everyday Sport Injuries:*

- The Essentials Step-by-Step Guide to Prevention, Diagnosis, and Treatment. DK Publishing; 2019.
15. Joyce D, Lewindon D. Sports Injury Prevention and Rehabilitation. Routledge; 2016. doi: 10.4324/9780203066485.
 16. Hyde TE, Gengenbach MS. Conservative Management of Sports Injuries. Lippincott Williams & Wilkins; 1997.
 17. Comfort P, Abrahamson E. Sports Rehabilitation and Injury Prevention. 1st ed. John Wiley & Sons, Ltd Wiley-Blackwell; 2010.
 18. Houglum PA, Perrin DH. Therapeutic Exercise for Musculoskeletal Injuries.; 2010. www.HumanKinetics.com.
 19. Blanchard S, Glasgow P. A theoretical model to describe progressions and regressions for exercise rehabilitation. Phys Ther. 2014; 15(3); 131-135. doi:10.1016/j.ptsp.2014.05.001.
 20. Peterson L, Renstrom P. Sport Injuries Prevention Treatment and Rehabilitation. Vol 110. Taylor & Francis Group; 2017.
 21. Jarvinen TAH, Jarvinen TLN, Kaarianen M, Kalimo H, Jarvinen M. Muscle injuries: Biology and treatment. Am J Sports Med. 2005;33(5); 745-764. doi:10.1177/ 0363546505274714.
 22. Jarvinen TAH, Jarvinen TLN, Kaarianen M, et al. Muscle injuries: optimising recovery. Best Pract Res Clin Rheumatol. 2007; 21(2); 317-331. doi:10.1016/j.berh.2006.12.004
 23. Madden CC, Putukian M, Young CC, McCarty EC. Netter's sports medicine. (1, ed.). Elsevier Inc; 2010.

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