

Sports injuries and rehabilitation programmes – An Overview

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Abstract

In this paper author seeks to study the sports injuries that occur during the events and the role of rehabilitation programs in correcting the injuries. In the modern era, rehabilitation after sports injury has become a domain for specialists, and its evolution has necessarily brought together the sports physiotherapist, the sports physician, and the orthopedic surgeon. The changing profile of sports related injury, as well as limited availability of facilities for rehabilitation in many areas of India, is a matter of concern. Elite sportspersons have some protection, but the average athlete is often left to fend for himself. Key factors in successful sports injury rehabilitation protocols are the application of modern rehabilitation protocols under appropriate supervision, appropriate and well timed surgical interventions, and judicious and need based use of pharmaceutical agents. Modern rehabilitation protocols emphasize teamwork and proper rehabilitation planning, and the rehabilitation team has to be lead by a trained sports physiotherapist, with an understanding of the protocols and interventions required at various stages. Injury specific rehabilitation protocols are being practiced worldwide but need to be introduced according to the nature of the sport as well as available facilities. Even in India, sports physicians are increasingly joining specialist rehabilitation teams, and they can help with medication, nutritional supplements, and specialized tests that could improve injury understanding. Inputs from surgeons are mandatory if surgical interventions have been performed.

What is often missing in the underdeveloped world is psychological support and a clear understanding by the athlete of his/her rehabilitation protocols. World over, the primary aims are safe return to sports and minimizing reinjury on return to sport; this involves rehabilitation in stages, and current methodology clearly demarcates acute and chronic phases of injury. Close coordination with trainers and coaches is mandatory, and all need to understand that the reconditioning phase is crucial; skill assessment before progression has now become a specialized domain and needs to be introduced at all levels of the sport. A key factor in all sports injury rehabilitation protocols is injury prevention; this involves data maintenance by teams or trainers, which is still not fully developed in the Indian context. The injury and subsequent problems need to be comprehended both by athletes and their coaches. The current review is an attempt to clarify some of the issues that are important and routinely used world over, with the aim to improving rehabilitation after sports even in the underdeveloped world.

Keywords— Conditioning, physiotherapy, return to sports, sports injury, sports rehabilitation

Introduction

The ever growing popularity of sports worldwide has made the “sports industry” extremely competitive and financially lucrative for athletes, with many striving for elite professionalism. This has consequently intensified the physical and emotional burden of sports, increased the training and practice regimens required, and exposed those involved in this quest to a higher risk of injury. In modern competitive sport, injured athletes are under pressure to return to competition as early as possible, which is often a demand for both the sportsperson and the team management. Athletes also stand a chance of losing their place in the team due to the highly competitive scenario and naturally come under higher pressures to return. Thus, compared to traditional

rehabilitation after injury, sports injuries rehabilitation requires more care, a highly structured and sports-specific approach, which should prepare both the athlete and the injured tissue for the following physical and psychological demands at the highest level of sport.

The growing popularity of the recently incepted hockey, football, and kabaddi leagues in India is evidence of a growing sports culture in a country predominantly favoring cricket. These sports are fast paced, played over a short timeline, and often pose a high fatigue and injury risk to the involved athletes. Studies from around the world emphasize the relation between the demands of the sport and the risks of injury.¹ Unfortunately, the lack of research and literature regarding structured programs addressing injury management and prevention in Indian athletes shows evidence that our country is lacking in the area in comparison to more developed countries such as the UK, the US, and Australia. A PubMed search using key words such as “Sports AND Injury AND Rehabilitation AND India” gave 26 citations, none of which was relevant, nor did any describe the topic under review. A PubMed search using key words such as “Sports AND Injury AND Rehabilitation AND Current Concepts” gave 79 hits, most of which were not specific to sports injury rehabilitation, and none of which was by an Indian author or focused on Indian athletes.

This paper attempts to update the sports rehabilitation personnel about available options and need based interventions for athletes, which could be applied even in the underdeveloped world.

Objective:

This paper author explores the range of sports injuries that sportsmen all over the globe experience during their active career and the role of rehabilitation programs in bringing them back to the sporting arena.

Epidemiology

Injuries in sport can occur through contact or noncontact mechanisms and maybe of an acute or overuse nature. They may involve muscle, ligaments, or bone, with stress fractures being somewhat unique to sports and overuse. Epidemiological studies have revealed no significant decrease in sports-related injuries over the past two decades, despite the heightened insight into injury mechanisms, prevention programs, and load monitoring techniques in athletes. In a study spanning over 16 years, Hootman et al. observed collegiate athletes in 15 different sports in the US. Their results concluded that lower limb injuries accounted for >50% of all sports injuries, with the knee and ankle being predominantly involved. The majority of the injuries were contact injuries, with significantly higher numbers being observed during competition compared to training injuries. Of the 15 sports, they analyzed that football (Gridiron) had the highest injury rate with competitive wrestling being the second largest. Over the 16-year period, the authors also observed that the increased physical demand, participation, and change of rules had a substantial effect on injury trends.

A prime example of such a correlation between injury trends and the demand for the sport is evident on observing the changing injury profile in elite level cricketers since the introduction of the shorter, yet physically demanding, T20 format of the game. Dhillon et al.⁴ showed a 16.8% incidence of upper limb injury, primarily during fielding, in a prospective evaluation of cricketers. Over the past ten cricket seasons, Orchard et al.⁵ found that hamstring and thigh injuries are now the most common injuries seen in elite cricket, which they attribute to the change in the format of the game. Tirabassi et al.⁶ concluded that of all the sporting injuries that led to disqualification on medical grounds, 60% were suffered during competition. Over an 8-year observation, the authors demonstrated lower limb injuries to be the most predominant with the highest incidence in football followed by gymnastics and wrestling. The site of injury could be sports specific, with upper limb injuries predominant in throwers and bowlers, while lower limb injuries predominate in games such as football. In a previous study by us in 2016, we evaluated the incidence of knee injuries in 24 different sports in India, in a study spanning 5 years. Similar to other studies, we observed a significantly higher injury rate during competition as compared to injuries during training. However, we found that a noncontact mechanism of injury was more predominant, with soccer and kabaddi injuries being the two most prevalent. In addition, we found that of all the injured athletes, only 39.8% returned to the sport, a figure significantly lower than a recent metaanalysis that showed 83% of athletes returning to their respective sport.⁸ Dhillon et al.⁹ in a focused review of 76 kabaddi players noted that 88.16% of knee injuries occurred during competitive sports and the anterior cruciate ligament (ACL) was injured in 89.47%; the sole issue was a presentation to treating surgeons fairly late, after a mean duration of 14.4 months after the injury episode. The time lost from sport averaged 16.6 months, with inadequate rehabilitation protocols being documented. A detailed analysis of the lower return to sports rate in India is beyond the scope of this paper; however, we can state that further studies are needed to examine and critique the injury management, rehabilitation, and return to competition programs and protocols administered in our country to shed light on the possible shortcomings.

It is evident that injuries and returning to the sport after that are major concerns among athletes and their treating clinicians, with a risk-free return to the competition being the top priority of rehabilitation. This review aims to present an evidence-based approach to sports injuries followed the world over, incorporating that high-quality interventions and protocols initiated minutes after an acute injury, up to the time the athlete fully returns to competition. It serves as a framework upon which readers can construct individualized rehabilitation programs for athletes at all levels, as a perfect recipe protocol does not exist.

The Framework of Sports Injury Rehabilitation

The team approach and proper planning

In modern sports injury management, a team approach involving the sports physician, physiotherapist, strength and conditioning coaches, sports psychologist, nutritionist, coach, and the athlete is critical. Most importantly the rehabilitation needs to follow a biopsychosocial approach.¹⁰ We need an understanding of the sport and what biomechanical and physiological demands this has on the athlete. Therefore, reviewing the current literature regarding the particular sport will aid in providing the clinicians with the understanding of common types of injury, the mechanism behind them, and the current management protocols being used globally. Documentation of baseline measures is paramount to compare outcomes to a preinjury level. Baseline measures are

usually undertaken during the preparticipation assessments and ideally done at the beginning of the sporting season. The rehabilitation team can then use these as a guide when making any decision regarding return to competition.

Aims of rehabilitation and planning

The primary aim is a return to sports at a preinjury physical and emotional level and to prevent reinjury. It is important to have an end goal in mind, preferably using baseline measures and player attributes documented at preparticipation, and work backward from where you want the player to be. The key points in the rehabilitation program should be planned and charted out.

In addition to injury-specific rehabilitation, it is important to eliminate risk factors and identify why the injury happened in the first place. Another issue of note is the prevention of overall deconditioning, which has to be factored in when designing the rehabilitation protocol.

Restore function and performance to a reinjure level For this, it is important to have baseline data in as many athletes possible, thus signifying the importance of routine screening of athletes and the documentation of their physical status. However, this may not be possible at all levels in most Indian sports and is not available at the amateur level. Strength and conditioning should aim to achieve power, strength, and endurance somewhat higher than what it was preinjury, as we have to factor in preventive measures for reinjury.

Safe return to the sport

Return to the sport can be interpreted differently by different members of the rehabilitation team; therefore, the clinician needs to specify in what capacity the athlete will be returning. We need to transition from rehabilitation into competition gradually so that athletes do not get injured as soon as they return. The player needs to complete a full training session with the team a few days before game day and should be symptom free throughout the training. One debate is how much of the game he should play in his first match after recovery; this depends on the demands of the sport and the position that he plays. For example, a goalkeeper coming back from lower limb injury could play an entire game, whereas a center forward with the same injury could face limited playing time. Similarly, a goalkeeper with a shoulder injury will have different transitions back into competition as compared to a center forward with a shoulder injury. This further cements the argument for an individualized and tailored rehabilitation approach to athletes. Another determinant is the time of the competition and these players return; some phases, such as finals or playoffs of an important series, require more physical loads on the body compared to normal league games.

Minimize risks of reinjure Injury is the biggest risk factor for a reinjure. Once athletes are back competing, careful monitoring is required. The importance of monitoring the physical load on players returning to competition is highlighted later in the review, and further, reading on monitoring of acute-chronic workload ratio is highly recommended. Monitoring the physical workload on athletes assists the clinicians in determining the optimum transition back to sport while ensuring minimal reinjury risk.

Stages of Sports Injury Rehabilitation: Evidence-based Practice

For a good sports rehabilitation practitioner, the motto should be “know the sport, review the literature.” Once defined, the rehabilitation is broken into different stages, and the athlete progresses through them till he is fit to return to play (RTP). The rehabilitation is based on an active rehabilitation model, with the aim of avoiding prolonged immobilization, which has potentially detrimental effects on muscle tone, strength, and structure.¹³ The progression along the rehabilitation continuum and stages should be based on functional criteria instead of being time based, with sport-specific functional testing determining the progression to the next phase. The key factor, however, is tissue healing, and it is important to keep the natural healing process in mind while constructing a program. Since the remodeling phase lasts for over a year, it would be wise to monitor the athlete and continue an ongoing strength and conditioning program for as long as all fitness goals are not met. The team physician could use pharmacological/medical interventions as appropriate at each stage of the rehabilitation process.

Acute phase: Promote tissue healing and avoid deconditioning

Traditionally, clinicians have been employing a protocol inclusive of protection, rest, ice, compression, and elevation (P.R.I.C.E) with the aim of avoiding further tissue damage, reducing associated pain, edema, and attempt to promote the healing process.¹⁴ Although an effective protocol for the general population, immobilization, and rest could potentially have a detrimental effect on muscle tone and strength in these sportspersons, it could negatively affect athletes aiming to return to a preinjury level of participation.¹³ Moreover, elite athletes are expected to return to competition at the earliest possible time and therefore require a different, more aggressive approach to rehabilitation, which needs to be initiated in the acute phase itself. Keeping the end goal of risk-free injury performance, it is proposed that clinicians follow a protocol inclusive of protection, optimal loading, ice, compression, and elevation (P.O.L.I.C.E) in the acute care setting for athletes.¹⁵ Since early mobilization and tissue loading has shown to have a positive effect to promote collagen reorganization and tissue healing,¹⁶ it is wise to initiate a loading program as soon as pain permits. Introductory loading should involve a return to full weight bearing, which can also be achieved through hydrotherapy or weight-assisted treadmills.¹⁷ Owing to its pain inhibitory effects, isometric exercise makes another excellent option as the first line of tissue loading intervention. However, clinicians need to respect the natural healing processes of the body and ensure a balance between loading and timely unloading to avoid damaging the healing tissue. Obviously, we need to protect the injured tissue from further damage, but we cannot allow detraining in the other areas, and simultaneous conditioning of the rest of the body needs to go on. Despite their being only Level IV and Level V studies, low-intensity pulsed ultrasound and neuromuscular electric stimulation are still used in the clinical setting in an attempt to manage inflammation and promote tissue healing.

In addition to the physical requirements, the multidisciplinary team needs to address the mental and emotional demands of elite sport as well. It is recommended that elite athletes undergo psychologically²¹ and nutritional interventions²² early in the program, to ensure all well-being, and provide the injured tissues with high quality nutrients to allow optimum healing. Progression of interventions to the next phase of rehabilitation is strictly based on achieving a predetermined set of functional criteria, timelines of which would differ regarding individual athletes.

Gymnastics Injury Prevention Tips: Insist on spotters when learning new skills

Warm up muscles with light aerobic exercise, such as jumping jacks or running in place, before beginning training or new activities

Inspect equipment to ensure that it is in good condition, including padded floors, secured mats under every apparatus, and safety harnesses for learning difficult moves

Wear all required safety gear whenever competing or training — special equipment may include wrist guards, hand grips, footwear, ankle or elbow braces, and pads

Do not "play through the pain" — if you are hurt, see your doctor and follow instructions for treatment and recovery fully

Make sure first aid is available at all competitions and practices

Cheerleading

Cheerleading is considered an athletic activity that incorporates elements of dance and gymnastics along with stunts and pyramid formations. Cheerleading competitions at the high school and collegiate levels have created a whole new dynamic, including increased risk for injury.

Some of the most common cheerleading injuries include:

One study estimates that cheerleading led to 28,000 emergency room visits in 2009 (the latest year for data). While not as frequent as injuries in other sports, cheerleading injuries tend to be more severe, making up more than half of the catastrophic injuries in female athletes. Cheerleading injuries affect all areas of the body — most commonly the wrists, shoulders, ankles, head, and neck.

Other Injuries and Rehab:

Stunt restrictions - In an attempt to curb the amount of catastrophic injuries in cheerleading, restrictions have been placed on stunts. They range from height restrictions in human pyramids, to the thrower-flyer ratio, to the number of spotters that must be present for each person lifted above shoulder level.

For example, the limit for pyramids is two body lengths for the high school level and 2.5 body lengths for the college level, with the base cheerleader in direct contact with the performing surface. Base supporters must remain stationary and the suspended person is not allowed to be inverted or rotate on dismount.

Basket toss stunts in which a cheerleader is thrown into the air (sometimes as high as 20 feet) are only allowed to have four throwers. The person being tossed (flyer) is not allowed to drop the head below a horizontal plane with the torso. One of the throwers must remain behind the flyer at all times during the toss.

Mats should be used during practice sessions and as much as possible during competitions. Cheerleaders should not attempt a stunt if they are tired, injured, or ill, as this may disrupt their focus and cause the stunt to be performed in an unsafe manner.

Training - The importance of a qualified coach is also critical. Coaching certification is encouraged. Precautions should always be taken during inclement weather for all stunts. Also, a stunt should not be attempted without proper training, and not until the cheerleader is confident and comfortable with performing the stunt. Supervision should be provided at all times during stunt routines.

As with any sport, proper conditioning and training are important to minimize injury, including:

- Resistance exercises to gain strength in the lower back, stomach, and shoulders
- Regular stretching, yoga, or pilates instruction to improve flexibility
- Speaking with a sports medicine professional or athletic trainer if you have any concerns about injuries or cheerleading injury prevention strategies
- Returning to play only when clearance is granted by a healthcare professional

Conclusion

Rehabilitation after a sports injury is a crucial aspect to ensure full recovery, minimize time off from sports, and to prevent reinjury. Modern rehabilitation methods have surpassed traditional management protocols and are based on an active rehabilitation framework that demands equal participation from the athlete and the entire rehabilitation team.

Attempts are made to ensure the earliest RTP, and even though the sports clinicians are responsible for a safe transition back to competition, it is important to remember that the athlete has the final say. The role of surgical interventions, as well as pharmaceutical requirements, is need based and beyond the scope of this manuscript, but the major work on a sportsperson after injury is done by the rehabilitation team. In addition, one must not ignore nutritional supplementation and psychological intervention, which have a major role in getting the athlete back to full fitness, along with injury-free return to sports at the same level when he was injured.

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