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A Compressive review on the Management of Concussion in Athletes and Recovery duration

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ABSTRACT: Concussion, a mild-traumatic brain injury (TBI), occurs when the brain is jolted or twisted inside the skull. It is a complex physiological process that affects cerebral function, which is often diagnosed subjectively during a clinical examination and can be confirmed by a variety of techniques that monitor brain activity. Understanding age-related changes in risk and concussion care is critical, given that majority of contact or crash sport players are under the age of 19.

Objective: The purpose of this study is to provide an overview of sports-related concussions in athletes while also analyzing recent clinical and scientific results. **Methodology:** This comprehensive study summarizes findings from peer-reviewed articles, clinical reports, and meta-analyses published in the recent decade and accessed through databases such as Pub Med, Scopus and Web of Science. **Result and discussion:** The studies showed that the recovery time for concussions varies depending on severity, athletic history, and age. Most athletes recover within 2-4 weeks, with some cases taking longer. High school athletes reported symptom relief after 15 days, compared to 6 days for undergraduate athletes. College and high school athletes recovered cognitively at similar rates (5-7 days). **Conclusion:** Concussion management in young athletes is critical for ensuring safe recovery and minimizing long-term complications. Emphasizing early diagnosis, structured care, and preventive strategies can enhance recovery rates and promote athlete well-being in sports environment.

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INTRODUCTION:

Concussion is minor traumatic brain injury (TBI) caused by bouncing or twisting of the brain in the skull [1]. Diagnosing a concussion is primarily a subjective process based on clinical examination, often supplemented by tools that evaluate different aspects of brain function. Since most individuals participating in contact or collisional sports are below the age of 19, it is crucial to recognize age-related variations in both the risk of injury and the recommended strategies for management of concussions in young athletes [2]. Engaging in sports offers young athletes a chance to stay

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physically active while reaping numerous benefits, including improved physical health, enhanced psychological well-being, stronger social connections, and better academic performances¹⁵¹. Despite all these benefits, there is growing concern about the safety of youth sports, especially contact sports like, American football, soccer, ice hockey, or lacrosse, where 3.8 million concussions happen every year. All degrees of sports related concussions are becoming a bigger public health issue¹⁹¹. According to the Centers for Disease Control and Prevention (CDC), 1.6 million concussions happen every year. However, as many people with concussion choose not to seek any medical attention, this number probably underestimates the actual extent. In order to improve suggestions for handling of sports-related concussions (SRC), using an evidence-based consensus report, the Amsterdam 2022 International Consensus Statement on concussions in sports improves on earlier Concussion in Sports Group (CISG) decisions¹⁴¹. The evidence and practice-based suggestions derived from the conference's expert consensus and scientific research are compiled in this statement. The Concussion Recognition Tool-6 (CRT6), Sport Concussion Assessment Tool-6 (SCAT6), and Child SCOAT6 are among the freely available tools for identifying and evaluating sport-related concussions (SRC)¹⁶¹. By determining the primary causes of traumatic brain injury, the factors that influences its severity, the most common age groups and other risk demographics, reviewing epidemiological data makes it easier to establish preventive measures¹⁸¹. One can create, appropriate health-care services from sub-acute and emergency medicines to neuro-rehabilitation, by knowing the prevalence and severity of injuries in addition to identifying the mechanism of harm. This helps us evaluate the training needs of the healthcare workforce. Additionally, it enables us to project future socio-economic requirements in order to lessen the strain on the governments and society at large¹⁷¹.

The objective of this study is to evaluate and summarize the factors influencing concussion recovery in athletes, with an emphasis on role of proper management strategies, rehabilitation techniques, and prevention measure. The study also aims to promote awareness of concussion management and highlight best practices to ensure athlete's safety, expedite recovery, and reduce the risk of long-term complications.

METHODOLOGY:

The study involves a comprehensive review of literature from databases such as PubMed, Scopus, Google Scholar, and Web of Science, focusing on peer-reviewed journals, articles, and case studies related to concussions. It will critically appraise and synthesize data to understand concussions and recovery timelines in athletes. A minimum of 50-100 relevant articles meeting the inclusion criteria will be analyzed. Articles published within the last decade that focus on concussion and recovery timelines will be included, while non-peer reviewed studies, those with incomplete data or unclear methodologies and papers unrelated to concussion and its recovery will be excluded. Key data such as study design, case details, interventions, outcomes and limitations will be extracted from each article. This review will provide evidence-based recommendations for concussion management and recovery in athletes.

RESULT:

The findings reveal a great deal of variation in duration of recovery, which can be attributed to number of factors including the athlete's age, concussion history, and the severity of injury. Majority of the athletes recovered in 2-4 weeks; however some cases required more time. Compared to university athletes, high school athletes reported symptom recovery in 15 days as opposed to 6 days. There were eleven articles included: six randomized control trials and five retrospective cohort studies. Various balancing therapies, visual interventions based on vestibulo-ocular reflexes (VOR), and cervical manual therapy were employed during vestibular rehabilitation therapy (VRT) for athletes recovering from concussions. Visual interventions and cervical manual therapy used in early rehabilitation dramatically reduced symptoms and time to return to sport. However, balance therapies alone did not significantly reduce time to return to the sport¹¹⁰¹.

The weekly cognitive performance of athletes was assessed using the impact test, which evaluates verbal and visual memory, visual-motor speed, and reaction time. The results show progressive improvement in cognitive functions across three weeks, as summarized in Table 1.

Table 1. Patient's Weekly Cognitive Performance on Impact Test ^[10].

Test	Weekly visit: Percentile (Classification)		
	1	2	3
Memory Composite Verbal	1 (Impaired)	6 (Border line)	10 (Low Average)
Memory Composite Visual	6 (Border line)	20 (Low Average)	25 (Average)
Visual Motor Speed Composite	86 (High Average)	90 (High Average)	94 (Superior)
Reaction Time Composite	60 (Average)	69 (Average)	72 (Average)

DISCUSSION:**Concussion and its impact on athletes:**

Concussions are increasingly prevalent subject in the world of sports, particularly among athletes. Head injuries, often neglected or misunderstood, can have devastating repercussions if not treated properly ^[6].

Signs and symptoms of concussion:

Recognizing the signs and symptoms of a concussion is vital for rapid treatment, despite being a common sports injury. Following a head injury, athlete may endure headaches, dizziness, nausea, and impaired vision ^[7]. It is critical to pay attention to small changes in behavior or cognition as well. Severe concussion symptoms include sensitivity to light or noise, confusion, memory issues or loss of consciousness ^[9]. Athletes may feel weariness or difficulties concentrating following an injury. Any unexpected conduct should be handled carefully and addressed by medical specialists immediately. Symptoms may emerge hours or even days after the initial hit. Thus, athletes should disclose any head injuries immediately and receive adequate evaluation before returning to play. Ignoring these signs can lead to longer recovery times and increase the risk of future brain damage ^[11].

Importance of proper management for concussion recovery:

To achieve the best recovery outcomes, athletes recovering from concussions must follow proper care protocols. This involves a structured process that begins with rest and progresses to increased physical and cognitive activity. Cognitive and physical rehabilitation

therapies are essential for promoting recovery ^[11]. Healthcare specialists regularly monitor symptoms and progress in order to develop treatment program specific to each athlete. Effective concussion therapy not only speeds up recovery, but also reduces the chance of long-term complications such as post-concussion syndrome. Giving athletes sufficient direction and assistance during their recuperation promotes a safe return to sports, lowering the chances of re-injury and setbacks ^[4].

Common treatment options for concussion:

When treating concussions in athletes, healthcare professionals frequently recommend a combination of techniques to ensure a successful recovery ^[7]. Initially rest is required to allow the brain to repair, which includes both physical and cognitive rest. This could include limiting screen time and avoiding activities that exacerbate symptoms. In rare situations, drugs may be administered to treat symptoms like headaches or nausea, but they should not be the primary focus of rehabilitation. Instead, a more complete strategy is recommended ^[12]. Cognitive treatment can help athletes deal with residual mental symptoms and enhance cognitive function, whilst physical therapy can help with balance and coordination deficits induced by concussion. Gradual return-to-play protocols, guided by medical specialists, are vital for safe and successful sports participation ^[13].

Factors affecting recovery time:

A variety of factors can influence an athlete's recovery time after a concussion. One of the key variables is the degree of the initial injury; more severe concussions typically require a longer recovery period. Individual factors such as the athlete's age, overall health and previous concussion history are also important considerations ^[12]. For example, younger athletes and those with history of numerous concussions may face lengthier recovery durations.

Another key factor is the promptness with which one seeks medical assistance ^[2]. Early diagnosis and management are critical for establishing an efficient and effective recovery process. Following a prescribed treatment measure, including proper rest, is essential for speeding up the healing process. Furthermore, the support strategies in place, both at home and within sports team, can greatly affect the healing journey. Psychological issues, such as stress and worry might affect an athlete's general well-being and capacity to recover properly ^[6].

Strategies to prevent and minimize the risk of concussion:

A variety of measures can be used to prevent and reduce the risk of concussion in athletics. To reduce the danger of head injury, the athletes should be taught effective tackling and heading procedures [14]. Coaches and trainers are critical in creating a safe atmosphere by aggressively enforcing rules against risky activity that could result in head injuries. Regular monitoring during the games and sessions identifies suspected concussions early, allowing timely medical care [9].

Promoting a safe environment within the teams helps athletes to openly discuss head injury concerns [1]. Educating athletes about concussion symptoms allows them to seek timely medical attention. Properly fitting and maintaining sports equipment, such as helmets, is a vital preventive step. Optimizing concussion management for athletes seeking a safe return to play requires an understanding of many impacting elements. Creating a safe environment for all sports participants [14].

CONCLUSION:

Ensuring athlete safety and promoting healthy recovery from concussions is critical in sports. Concussions must be managed correctly to safeguard athlete's immediate and long-term health. Understanding the symptoms, indicators, and possible treatment enables athletes to heal safely before returning to play.

Collaboration among coaches, medical professionals, and athletes is critical to ensure a safe and effective healing process. Preventive strategies like correct training practices, using well maintained equipment, enforcing rules and establishing educational programs lowers the incidence of concussion. Prioritizing athlete safety not only improves their performance but also protects their long-term health and well-being. Raising awareness concerning concussion management protects athlete's future and promotes a safer sports environment for all involved.

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