



SPORTS PHYSIOTHERAPY AS A REVOLUTION FOR THE ATHLETES: A COMMENTARY

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ABSTRACT

Sports have reached, now-a-days, up to the highest levels of professionalism, thus are more physically and psychologically demanding. Sports injuries are now quite widespread too. These injuries can reduce the athletes' performance and keep them away from reaching their fullest potential. Sports medicine, a discipline of modern medicine deals with physical fitness as well as the diagnosis, treatment, and prevention of sports injuries. Physiotherapists are the crucial members of the sports medicine team for the healing of sports injuries. In the present commentary, an attempt has been made to review the role of sports physiotherapists for the holistic development of sports persons and the application of artificial intelligence (AI) in sports for future prospective of it.

KEYWORDS: Sports physiotherapy, role of sports physiotherapists, artificial intelligence, its future prospects.

INTRODUCTION

Though the science of physiotherapy is believed to have been practiced as early as 400 BC by Hippocrates and Galen as they advocated manual therapy techniques, massage, and hydrotherapy methods in treating their patients, the worldwide popularity of physiotherapy practice is quite recent. The process involves the use of mechanical movements and forces to remediate impairments and help to promote function, mobility, and quality of life. Sports physiotherapy is an important branch of physiotherapy. For sports physiotherapists, a strong athlete-therapist relationship is essential for efficient treatment and establishing athletes' expectations for injury recovery. Therefore, it is crucial to consider the expectations of the injured athletes while creating a rehabilitation program.^[1] Despite the increased understanding of injury processes, prevention strategies, and load monitoring techniques in athletes over the past 20 years, epidemiological studies have not found a statistically significant decline in sports-related injuries.^[2] Sports physiotherapists have a crucial role in the management of sports injuries. In international and elite sports, a sports physiotherapist's primary responsibilities continue to be injury treatment and rehabilitation as well as performance enhancement through interventions for injury prevention, management, and recovery.^[3]

The Role of Sports Physiotherapists

As sports physiotherapy has become a rising specialization^[4], certain qualifications and requirements are connected to the many overlapping duties performed by sports physiologists.^[5] The essential roles of the sports physiotherapists are:

Treatment of sports-specific injuries: A sports physiotherapist must have effective skills for the treatment of injured athletes on the ground as well as in camps with the help of various physiotherapeutic treatment protocols.^[6]

Injury Prevention

Firstly, the risk of injury should be evaluated by the sports physiotherapists, and then they need to educate the preparing athletes so that there is a decrease in the incidence and recurrence of particular sports injuries. They also provide the athletes with a suitable warm-up workout before the game that helps to prevent injuries.

Seeking Acute Intervention

Any disease or injury can be treated and managed effectively by sports physiotherapists applying their knowledge and abilities to respond to an acute sickness or injury and thus, help an athlete to recover more quickly by regulating blood pressure, maintaining healthy cardiac function, and maintaining proper blood circulation.^[7]

Rehabilitation of Athletes

Through their clinical reasoning and therapeutic diagnoses for any ailments related to sports, the sports physiotherapists assist in the rehabilitation of athletes with specific rehabilitation protocols ensuring that the rehabilitating athletes would return to their game in minimum possible time.^[8]

Performance Enhancement

The performance of the athletes may increase manifolds with the help of applying regular physiotherapy training protocols. The use of physical therapy reduces muscle tension and improves the amount of oxygen reaching the tissues. Along with effective cell-to-cell communication, it also aids in optimal regulation and coordination. It also improves the athletes' agility and speed, which is a more dazzling achievement in their performances.

Improvement of a Healthy, Active Lifestyle

With regular physiotherapy exercises, the athletes are able to deal safe, healthy, and active lives. This makes them a champion in many other spheres and capable of engaging in a variety of physical activities.^[9]

Enhancing Professionalism and Managerial Competence

The athletes gain superior time management and resource management abilities through regular physiotherapy exercises. These fundamental abilities are developed by individuals through professional, social, and ethical disciplines.^[10]

Living a Disease-free Life

Sports physiotherapy is a great method, enabling an athlete to stay fit, active and have a disease-free, healthy life. By following regular physical exercise protocols provided by the sports physiotherapists, the immunity of the athletes may increase manifolds.

Artificial Intelligence (AI) in Sports

The term artificial intelligence (AI) commonly refers to the use of computers and technology to simulate intelligent behaviour and critical thinking comparable to a human being.^[11] It was first reported by John McCarthy in an academic conference in 1956 as the science and engineering of making intelligent machines.^[12] Since then, the international scientific society have witnessed substantial growth in AI, especially over the last decade, where the focus of investment has been on clinical applications in healthcare.^[13] Similarly, AI in sports is referring and changing the application of technology to several facets of the elite sports sector.^[14] The extension of AI into the sports sector is still in its infancy, but shows promise in predicting and preventing athlete injury, enhancing the precision and accuracy of injury assessment, optimising recovery plans, improving patient education, monitoring rehabilitation progress, and predicting return to play.^[13,15]

AI is actually cited as the fourth industrial revolution and is considered the next frontier in medicine that is going to transform the field of orthopaedics and sports medicine.^[16] Therefore, the adoption of AI by sports professionals and scientists is standing out in recent years as a priority since these emerging technologies and applications affect professional sports at various levels of sophistication.^[17]

Some of the uses and applications of AI in sports

AI Statistics in Sports and Gaming

1. Talent Identification and Acquisition

Recent Advances: AI-powered algorithms are being used by teams to analyse player performance data, genetics, and physical attributes to predict future success. Tools like AI-powered scouts and wearable technology help identify hidden talent in grassroots levels and across global competitions.

2. Game Analytics

Recent Advances: Real-time performance tracking through AI and machine learning helps teams analyse match data in seconds, offering insights into player positioning, team dynamics, and opponent strategies. Companies like Second Spectrum are using AI to provide advanced data visualisations for both teams and broadcasters.

3. Training and Coaching

Recent Advances: AI-based virtual coaching assistants can analyse player form, biomechanics, and endurance in real-time. With wearable tech, coaches receive immediate feedback on player conditioning, helping optimise individualised training plans. AI systems like Home Court (used in basketball) have enhanced player training by providing instant performance reviews.

4. Predictive Modeling

Recent Advances: Predictive AI models analyse vast amounts of historical match data to provide detailed forecasts on game outcomes, player performance, and injury risks. These tools are increasingly integrated with betting platforms and in sports strategy development. AI models like IBM Watson are used in major tennis tournaments to predict match results.

5. Strategy Improvement

Recent Advances: AI-driven simulations analyse different game scenarios to refine strategies. Teams like Liverpool FC and NBA franchises use machine learning to predict and counter opponent strategies in live games. Reinforcement learning is becoming a key tool in tactical decision-making and strategy optimisation.

6. Injury Prevention

Recent Advances: AI algorithms are being developed to predict injuries before they happen by analysing biomechanics, training load, and past medical data. Tools like Zone7 and Catapult provide early warnings about

potential injuries, helping sports medical teams adjust training loads and prevent overexertion.

7. Fan Engagement

Recent Advances: AI chatbots and recommendation engines enhance fan experiences by providing personalised content and real-time information. Platforms like IBM Watson engage fans through personalised game highlights, player stats, and custom experiences during live events.

8. Immersive Experiences

Recent Advances: AI has brought immersive experiences like augmented reality (AR) and virtual reality (VR) into fan engagement and training. Virtual stadiums powered by AI, combined with real-time data feeds, allow fans to experience matches from unique angles and perspectives. In gaming, AI-based NPCs and environments provide a more immersive experience.

Recent Advances: AI is enabling more data-driven, evidence-based decision-making in both sports and gaming. Machine learning models are used in rehabilitation, treatment planning, and performance tracking, ensuring the best practices are backed by robust data analytics and simulations.

The Future of AI Technology in Sports

AI has become a valuable tool for athletes, sports scientists and companies, organisations, and spectators. Its broad applications also leave a broad scope of implementation, which is likely to lead to even more interest in AI research and development for sports. However, despite the immense potential of these technologies for injury prediction, performance analysis, personalised training, and optimised management, one cannot ignore challenges related to the complexity of sports dynamics, data quality, interpretability of produced models, the loss of the clinician-patient relationship and the multidimensional aspects of athletic performance.^[18] Therefore, the use of AI may be better complementary rather than substitutional in sports. In addition, the result of AI application should be assessed by comprehensive cost-benefit analyses, considering factors such as initial investment, maintenance costs, and long-term outcomes before its broad implementation.^[15] Future studies should also look at ethical issues, regulation and liability around the wide application of AI systems.^[19]

CONCLUSION

From the discussion of the commentary, it might be concluded that the sports physiotherapists have many important roles to perform for the development of sports, i.e. injury prevention, seeking acute intervention, rehabilitation of athletes, performance enhancement, improvement of a healthy, active lifestyle, enhancing professionalism and managerial competence, living a disease-free life, etc. Artificial intelligence has become a boon to the sports with its several effective use and

application, like, talent identification and acquisition, game analytics, training and coaching, predictive modelling, strategy improvement, injury prevention, fan engagement, immersive experiences many others, with lot of future prospects.

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