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BIOMECHANICS IN SPORTS: PERFORMANCE ENHANCEMENT AND INJURY PREVENTION

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ABSTRACT

Sports biomechanics, a significant element in sports, influences a player's performance and injury rate. Enhancing the performance of players without injuries is the primary goal of sports biomechanics. Sport biomechanics covers physiology, kinesiology, and physics in order to prevent injuries.

Keywords: Physiology, Motion, Acceleration, Equilibrium, Velocity, Performance, Injury, Rehabilitation

1. INTRODUCTION

Sports biomechanics is the scientific study of how athletes move mechanically during a particular sport. In order to improve player performance and lower the chance of injury, it entails examining the motions and variables that influence players. Through the integration of biomechanics concepts from physics, engineering, anatomy, and physiology, sports biomechanics offers valuable insights into the best ways to move.

2. AIMS AND OBJECTIVES

1) To helps analyze athletic movements

2) To identify dangerous patterns and reduce the likelihood of musculoskeletal injuries occurring.
3) To optimizing the efficiency of movements, players are able to perform better while reducing the stress on their bodies.
4) To helps design effective rehabilitation programs by analyzing how the wound affects movement.
5) To Studying factors like fatigue, movement asymmetry, or lack of sleep helps predict potential injuries in youth and professional athletes.
6) To identifies the causes of injuries (e.g., excessive joint stress) and guides interventions to lower injury severity.

3. OPERATIONAL DEFINITION

3.1. SPORTS BIOMECHANICS

"Sports biomechanics is the quantitative based study and analysis of athletes and sports activities in general. It can simply be described as the physics of sports."

Biomechanics is the Science concerned with the internal and external forces acting on a human body and the effects produced by these forces.

3.2. INJURY

"A violation of a legally protected interest (as the physical or mental well-being, property, repetition or rights of another) for which the law allow sanction for legal or equitable relief."

4. COMPONENTS OF SPORTS BIOMECHANICS

- **Kinematics:** examine show bodies move without ignoring the forces that create it, concentrating on metrics like displacement, acceleration, and velocity. This field examines how bodies move Without taking into account the forces that generate it. In order to explain how athletes move, it looks at metrics like displacement, acceleration, and velocity.
- **Kinetics:** examines the internal (muscle contraction) and external (gravity, friction) factors that cause or modify movements. Understanding the forces that create or modify motion, such as internal forces like muscle contractions and external forces like friction and gravity, is the focus of kinetics. It is essential to comprehend these pressures in order to maximize athletic performance and lower the risk of injury.
  1) **Dynamics:** Analyzes bodies in motion with acceleration, encompassing both kinematics and kinetics.
  2) **Statics:** Investigates systems in equilibrium, either a trest or moving with constant velocity.
  3) **Functional Anatomy:** This area studies the structures of the human body and there specific functions during movement. Knowledge of muscles, bones, and joints is essential for analyzing athletic techniques and developing training programs.
  4) **Mechanical Principles:** Applying laws of physics, such as Newton's laws of motion, helps in understanding how athletes can maximize efficiency and effectiveness in their movements.

5. APPLICATIONS IN SPORTS

1) **Performance Enhancement:** Through an understanding of movement mechanics, athletes can improve their techniques to become more successful and efficient. For example, examining a sprinter's stride canreveal changes that can be made to increase speed.
2) **Injury Prevention:** Finding mechanical flaws in movement pattern said in the creation of injury prevention plans. For instance, jumpers can lower their chance of leg injury by improving their poor landing technique.
3) **Equipment Design:** Sports equipment that enhances natural movements and improves performance and safety is developed with the help of biomechanical studies. This includes creating shoes that minimize the chance of damage and offer the best possible support.

4) **Rehabilitation:** Rehabilitation programs are guided by post-injury biomechanical examinations that emphasize the restoration of normal movement patterns, guarantee in safe return to sports.

6. ENHANCING ATHLETIC PERFORMANCE

Players can improve their movements for optimal effectiveness by comprehending biomechanics. Through the analysis of speed, force, and energy during athletic events, athletes can modify their methods to enhance their performance. For instance, biomechanical analysis can be used to improve running postures or stroke methods in sports like swimming or running in order to boost endurance and speed.

7. REHABILITATION AND RECOVERY

In the rehabilitation setting, biomechanics helps create recovery plans that work. The rapists are able to create focused exercises that advance healing and restore function by examining the mechanics of affected areas. This method guarantees that athletes recover their skills effectively and securely.

8. METHODOLOGY

The researcher observed and collected data from the inter collegiate and inter zone competitions, player's activity, and moments in their skills in different competitions in 2023 & 2024. The researcher has obtained information through secondary data websites and international journal publications.

9. CONCLUSION

Sports biomechanics is essential to contemporary athletics because it offers a scientific foundation for optimizing the design of sporting goods, reducing injuries, and increasing performance. It provides athletes, coaches, and medical professionals working in sports science with insightful information gleaned from a thorough examination of movement. Sports biomechanics provides a thorough understanding of human movement in sports by combining concepts from anatomy, engineering, and physics. Its uses in injury prevention, increased performance, and rehabilitation make it a vital field for players, coaches, and medical professionals who are committed to maximizing sports performance and guaranteeing athlete care.

CONFLICT OF INTERESTS

None.

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