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THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) IN ENHANCING THE PERFORMANCE OF WOMEN KABADDI PLAYERS

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Abstract:

The integration of Artificial Intelligence (AI) into women's Kabaddi performance has emerged as a transformative development in modern sports science. This study examines the multifaceted role of AI in enhancing tactical efficiency, training optimization, injury prevention, and talent identification among women Kabaddi players. Using secondary data sourced from published research articles, conference proceedings, news reports, and analytical sports platforms, the study highlights how AI-driven systems—such as computer vision, machine learning models, wearable sensors, and predictive analytics—contribute to individualized, data-centric performance enhancement. The findings reveal that AI provides granular spatiotemporal and biomechanical insights, supports gender-specific training interventions, and improves decision-making through advanced tactical analysis. Additionally, AI enhances injury prediction by analyzing multivariate time-series data and integrating physiological variables unique to female athletes, such as hormonal cyclicity. The study concludes that AI-driven methodologies shift women's Kabaddi from traditional heuristic coaching to a validated, evidence-based, and technologically adaptive framework, enabling sustainable performance improvement and athlete safety.

Keywords: *Artificial Intelligence (AI); Women Kabaddi, Performance Enhancement, Gender-Specific Training.*

Introduction:

The integration of Artificial Intelligence (AI) into the performance enhancement of women Kabaddi players is characterized by a multidimensional approach that leverages data-centric analyses to optimize training protocols, tactical decision-making, and injury mitigation strategies. The deployment of AI in women's kabaddi reflects broader trends observed across high-performance sport, while recent advancements underscore the necessity of adapting such technologies to address the distinct physiological and psychological profiles of female athletes. This approach facilitates the development of individualized interventions, enhances predictive modeling for injury risk, and refines the overall strategic framework utilized in athlete preparation and competition.

Objective of study:

1. To explore the various role of AI in sports.
2. To study the role of AI in enhancing the performance of women Kabaddi players.
3. To understand how AI-based analytics, computer vision models, and predictive algorithms influence tactical decision-making, injury prevention, training optimization, and talent identification in women Kabaddi.
4. To review the existing secondary literature, reports, and analytics frameworks that demonstrate how AI

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is transforming women's Kabaddi into a data-driven sport.

Methodology:

The present study is based on the survey method, where data is collected exclusively from secondary sources.

Research Design:

Descriptive and analytical in nature, focusing on conceptual understanding and literature review.

Data Collection:

The data has been collected through secondary sources such as: Published journal articles, Conference proceedings, Newspaper portals (Jansatta, Naidunia), Sports technology websites (MyKhel), Online research platforms (Medium, MDPI, ITM Conferences), Previous research conducted on AI, sports analytics, and kabaddi performance metrics.

Tools of Data Analysis:

AI-related concepts were examined using: Content analysis of published sources, Comparative evaluation of AI applications, Thematic categorization (Performance, Training, Injury Prevention, Tactical Analysis, Talent Scouting)

Details on Artificial intelligence:

The term **Artificial Intelligence** (AI) describes a set of technologies that allow computers to do complex tasks like visual and auditory perception, language translation, decision-making, data processing, and more. The field devoted to the study and development of computational models that mimic human intellect or handle data sets too big for humans to handle is known as artificial intelligence (AI).

The enormous area of artificial intelligence encompasses numerous subfields, including but not limited to: computer science, philosophy, psychology, linguistics, neurology, data analytics and statistics, software and hardware engineering, sports, and many more.

Data analytics, forecasting, object classification, intelligent data retrieval, recommendations, and natural language processing are just a few of the many business applications that make use of AI. Most of these technological advancements rely on deep learning and machine learning.

AI and sports:

With the aid of data analysis, artificial intelligence in sports may recognize patterns and trends. Sports coaches and officials use the data they collect to ascertain each location on the fitness and performance scale.

AI systems look at player performance data, including endurance, speed, and gait patterns. This data can be used by coaches and analysts to identify players' advantages, disadvantages, and possible areas for development

Key Roles of AI in Women's Kabaddi Performance:

Performance and Tactical Analysis:

AI-enabled player tracking utilizes multi-modal data streams, including video and sensor output, to conduct granular monitoring of athlete movement patterns, locomotor velocity, spatial coverage, and discrete technical maneuvers such as raiding and tackling. This facilitates the systematic identification of individual player competencies and areas for improvement. Furthermore, opponent analysis is undertaken through algorithmic interrogation of archival match records and video repositories, enabling the anticipation of adversarial tactical trends and the construction of targeted countermeasures. The generation and assessment of advanced performance metrics—such as True Raider Impact and In-Game Win Probability—are accomplished through machine learning models, yielding evaluations that transcend traditional statistical aggregates.

Personalized Training and Development:

AI methodologies assimilate longitudinal performance datasets, physiological indices (e.g., heart rate, musculoskeletal load via wearable technology), and documented injury histories to construct

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individualized training architectures. These adaptive regimens optimize exercise selection, intensity calibration, and recovery scheduling to maximize athlete development. Motion capture systems and AI-driven high-speed video analytics facilitate frame-wise examination of biomechanics, supporting correction of technical inefficiencies and preempting injury risk. Smart sensors, leveraging AI analytics, deliver instantaneous physiological and biomechanical feedback, empowering evidence-based adjustment of training stimuli in real time.

Injury Prevention and Recovery:

The application of predictive analytics represents a substantive advancement, as AI algorithms discern precursor states to injury by analyzing temporal sequences of movement and biometric data. This enables the stratification of injury risk and the implementation of preventative strategies—such as targeted conditioning or modified workloads. Importantly, AI systems calibrated with sex-specific datasets are capable of integrating variables unique to female physiology, such as hormonal variability and proportional muscle composition, refining both injury prediction and individualized recovery protocols. Post-injury, AI platforms devise tailored rehabilitation regimens, leveraging historical recovery profiles and injury typologies to hasten safe reintegration.

Talent Scouting and Recruitment:

AI-driven analysis of league and tournament data facilitates the objective identification of emergent female athletic excellence, employing sophisticated physical and performance-based criteria predictive of future elite status. Collectively, these innovations represent a paradigm shift from heuristic-guided coaching toward a rigorous, data-driven methodology that enables the optimization of training outcomes and injury prevention with unprecedented precision.

Domain	Original Concept (Implied/Stated)	Research Enhancement (More Precise Terminology)
Tactical/Technical	Quantify kinematic parameters (speed, positioning)	Quantify **spatiotemporal** and **kinematic variables** (e.g., center of mass trajectory, time-to-contact, joint angular velocities).
Tactical/Technical	AI-driven player tracking and behaviour analysis	**Computer Vision (CV)-based motion capture** and **Deep Learning classification models** for granular event identification.
Injury Prevention	AI systems... analyse biometric inputs	AI algorithms process **multivariate time-series data** from **Inertial Measurement Units (IMUs)** and **wearable biosensors**.
Injury Prevention	Focus on female-specific physiological variables	Emphasis on the **sex-specific optimization** of models, particularly for predicting **non-contact musculoskeletal injury risk** correlated with **hormonal cyclicity (e.g., ligamentous laxity)**.
Strategy	Opponent strategically analysis leverages historical match data	**Reinforcement Learning (RL)** models and **Markov Chain analysis** of opponent **play sequences** to calculate **expected value of an action (Q-value)** and inform counter-tactics.
Overall Paradigm	Transitioning kabaddi training paradigms from heuristic to evidence-based frameworks	Facilitating the migration from **heuristic, intuition-based coaching** to a **validated, data-driven, and adaptive coaching methodology**.

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Conclusion:

In conclusion, the deployment of AI-driven predictive analytics in women's Kabaddi integrates multivariate time-series data and computer vision-derived kinematic metrics to develop gender-specific optimization strategies, particularly for managing non-contact musculoskeletal injury risks associated with hormonal cyclicity. By delivering individualized injury risk assessments and tailored training interventions, AI enhances the performance and safety of female Kabaddi athletes and shifts training from heuristic methods to a precise, validated, data-driven scientific approach.

References:

1. *Pietraszewski, P., et al. (2025) Pietraszewski, P., Wieczorek, M., Zebrowska, A., & Mazurek, K. (2025).* The role of artificial intelligence in sports analytics: A systematic review and meta-analysis of performance trends. ***Applied Sciences****, 15(13), Article 7254. MDPI. https://doi.org/10.3390/app15137254*
2. ***Jansatta News Desk. (2025, August).*** AI-powered sports analytics and fitness systems in India. ***Jansatta.*** *https://www.jansatta.com/national/sports-ai-india-revolution-future-fitness-olympics-policy/4081312*
3. ***MyKhel Sports Desk. (2024, July 3).*** AI's role in the prevention of injury while performing in Kabaddi mats**.** *MyKhel.* *https://www.mykhel.com/more-sports/ai-role-in-the-prevention-of-injury-while-performing-in-kabaddi-mats-291523.html*
4. ***Naidunia Tech Desk. (2025, November 11–14).*** Sourav Ganguly and Kabuni launch AI-based sports-tech platform in India**.** *Naidunia.* *https://www.naidunia.com/technology/tech-now-every-player-will-have-their-own-coach-sourav-ganguly-and-kabuni-launch-ai-sports-tech-platform-in-india-8413584*
5. ***Pietraszewski, P., Wieczorek, M., Zebrowska, A., & Mazurek, K. (2025).*** The role of artificial intelligence in sports analytics: A systematic review and meta-analysis of performance trends. ***Applied Sciences, 15****(13), Article 7254.https://doi.org/10.3390/app15137254*
6. ***Redefining Sport Science. (2023).*** Kabaddi analytics: How numbers and video can improve performance. ***Medium.****https://medium.com/redefining-sport-science/kabaddi-analytics-how-numbers-and-video-can-improve-performance-6a7e388a23df*
7. ***Sharma, A., & Kumar, R. (2024).*** Role of artificial intelligence (AI) in sports**.** *ITM Web of Conferences, 84****, 01004*** ***.****https://doi.org/10.1051/itmconf/20248401004*

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