



Indigenous Sports to Academic Focus: A Bibliometric Analysis of Kabaddi Scopus-Indexed Literature From 2000–2026

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Abstract

Background: Kabaddi is a traditional indigenous sport that has developed into an organized competitive sport and has attracted increasing academic attention across multiple research domains. Research on Kabaddi has expanded across physical fitness, sports performance, training, body composition, biomechanics, sports injuries, sports medicine, and technology-oriented approaches. However, the literature is distributed across diverse research areas, authors, institutions, countries, and journals. Therefore, a comprehensive bibliometric analysis is required to examine the development, structure, and thematic landscape of Kabaddi research.

Method: The present study employed a bibliometric research design using publications indexed in the Scopus database. The search was conducted using TITLE-ABS-KEY (Kabaddi), which initially retrieved 121 records. After removal of one duplicate record and exclusion of eight publications published before 2000, 112 records published between 2000 and 2026 were included in the analysis. The selected records were analysed for publication trends, contributing authors, sources, institutions, countries, citation patterns, collaboration networks, and keyword co-occurrence. VOS viewer was used for network visualization and mapping, while Bibliometrix/Biblioshiny was used for descriptive bibliometric and thematic analysis.

Results: The findings demonstrate that Kabaddi research has developed across multiple interconnected areas of sports science. Keyword co-occurrence analysis identified major research themes related to physical fitness, agility, sports performance, training, body composition, anthropometry, sports injuries, and sports medicine. Injury-related research included themes such as knee injuries, anterior cruciate ligament injuries, joint dislocation, and other sports-related injuries. The analysis also identified technology-oriented terms, including machine learning, computer vision, deep learning, and data analytics, indicating the development of computational approaches within Kabaddi research. The co-authorship analysis revealed several distinct collaborative research groups rather than a single highly integrated author network. **Conclusion:** Kabaddi research has expanded from predominantly physical and performance-related investigations toward a broader multidisciplinary research landscape incorporating training, body composition, injury research, sports medicine, and technology-based approaches. The bibliometric mapping provides an overview of the intellectual and thematic structure of Kabaddi research and identifies areas that may support future research, particularly injury prevention, performance analysis, evidence-based training, and the application of emerging technologies in Kabaddi.

Keywords: Metal–Organic Frameworks (MOFs), Post-Synthetic Modification, Esterification, Acid Functionalization, Catalysis

Introduction

Kabaddi is a traditional contact team sport originating from the Indian subcontinent and has developed into an organized competitive sport with increasing participation and international visibility. The sport is characterized by repeated high-intensity efforts, physical contact, rapid changes in direction, agility, strength, speed, and sport-specific tactical skills. These characteristics place considerable physical and physiological demands on players and have encouraged scientific investigation into the performance requirements of Kabaddi. Previous research has examined physical and physiological characteristics of Kabaddi players, including anthropometric variables, agility, strength, and other performance-related attributes (Devaraju & Kalidasan, 2012; Gajanana Prabhu & Swamy, 2013; Bayati et al., 2025).

Research on Kabaddi has become increasingly multidisciplinary, covering several aspects of sport science and sports medicine. Studies have investigated anthropometric characteristics and body composition (Devaraju & Kalidasan, 2012; Bayati et al., 2025), agility and physical performance (Gajanana Prabhu & Swamy, 2013; Wismanadi et al., 2025), training methods and fitness development (Dharod et al., 2020; Nithin et al., 2024), and biomechanical and psychological characteristics associated with player performance (Bagha et al., 2015). In addition, sports injury research has examined anterior cruciate ligament and other musculoskeletal injuries among Kabaddi players, reflecting the importance of sports medicine and injury prevention within the field (Pavithralochaniet al., 2019; Hendrawan et al., 2024; Hardiansyah et al., 2024).

The Kabaddi research literature has also expanded from earlier investigations of basic physical and physiological characteristics toward more specialized studies involving training interventions, performance analysis, biomechanics, body composition, and injury prevention. For example, research has examined the prediction of Kabaddi playing ability using anthropometric and physical variables (Devaraju & Kalidasan, 2012), the role of agility in indigenous games including Kabaddi (Gajanana Prabhu & Swamy, 2013), and the effects of plyometric training on explosive power, agility, balance, and aerobic performance in Kabaddi players (Dharod et al., 2020). More recent investigations have examined Bulgarian bag training and its effects on biomotor fitness, physiological, haematological, and performance variables (Nithin et al., 2024), while recent studies have also focused on body composition and agility as determinants of Kabaddi performance (Wismanadi et al., 2025). Furthermore, recent systematic reviews have synthesized evidence concerning training interventions and Kabaddi-related injuries (González-Devesa et al., 2026; Hendrawan et al., 2024).

Although Kabaddi research has expanded across different disciplines and research themes, the literature is distributed across different authors, institutions, countries, journals, and subject areas. The studies included in the present Scopus dataset demonstrate this multidisciplinary nature, with research addressing physical fitness, training, anthropometry, performance, biomechanics, psychology, sports medicine, injuries, and data-driven performance analysis. However, individual studies and systematic reviews generally address specific research questions or subtopics. Consequently, there is a need for a broader quantitative examination that brings these fragmented research outputs together and identifies how the Kabaddi research field has developed, which research constituents have contributed to it, and which themes and topics have received increasing scholarly attention.

Bibliometric analysis provides a quantitative approach for examining the structure, development, and trends of a research field. It can be used to analyze publication productivity and citation impact and to identify relationships among authors, institutions, countries, journals, documents, and keywords. In addition, science-mapping techniques can be used to visualize collaboration networks, co-occurrence of keywords, citation relationships, bibliographic coupling, and thematic structures within a research domain (Donthu et al., 2021). Bibliometric software and visualization tools such as Bibliometrix/Biblioshiny and VOS viewer can further facilitate the analysis and graphical representation of large bibliographic datasets (Moral-Muñoz et al., 2020; Donthu et al., 2021).

Therefore, the present study aims to conduct a bibliometric analysis of Kabaddi research published between 2000 and 2026 using bibliographic records retrieved from the Scopus database. The study seeks to examine the development and publication trends of Kabaddi research and to identify the major contributing authors, sources, institutions, countries, citation patterns, keywords, research themes, collaboration structures, and emerging areas of investigation. The period 2000–2026 was selected to examine the development of Kabaddi research over the twenty-first century and to capture both earlier research and the recent expansion of studies up to 2026. The analysis is intended to provide a comprehensive quantitative overview of the Kabaddi research landscape and to identify directions for future research in the field.

1.2. Objectives of the Study

- To examine the publication growth and research trends in Kabaddi literature from 2000 to 2026.
- To identify the major contributing from different authors towards the Indigenous sports kabaddi and current trends.
- To analyse the collaboration networks among authors, institutions, and different countries in the field of Kabaddi literature.
- To identify the major research themes, keywords, trends, and emerging areas of Kabaddi bibliometric literature.

2. Methodology

2.1 Research Design

The present study employed a bibliometric research design to examine the development and research trends in Kabaddi-related literature. Bibliometric analysis provides a systematic quantitative approach for analysing publication patterns, citations, research contributors, collaboration networks, keywords, and emerging research themes (Donthu et al., 2021).

2.2 Data Source and Search Strategy

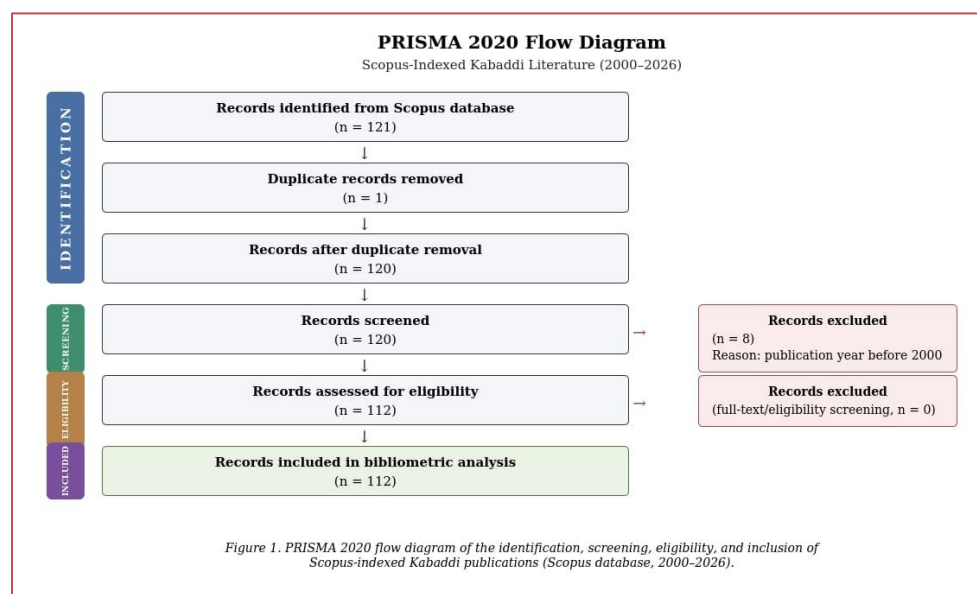
The bibliographic data for the study were retrieved from the Scopus database. The search was conducted using the keyword “Kabaddi” in the TITLE-ABS-KEY field. The initial search retrieved 121 records. For the present study, publications falling within the period 2000–2026 were considered for analysis.

The search query used was:

- TITLE-ABS-KEY (Kabaddi)
- The retrieved records were exported in CSV format and subsequently used for data screening, cleaning, and bibliometric analysis.

2.3 Inclusion and Exclusion Criteria

Publications indexed in Scopus and published between 2000 and 2026 were included in the study. Records published before 2000 were excluded because they fell outside the predefined study period. Duplicate records, if identified during data screening, were also removed before the final analysis.



The dataset contained 121 records. One duplicate was removed. Eight records published before 2000 were excluded according to the predefined study period (2000–2026), resulting in 112 unique records for bibliometric analysis.

2.4 Data Analysis

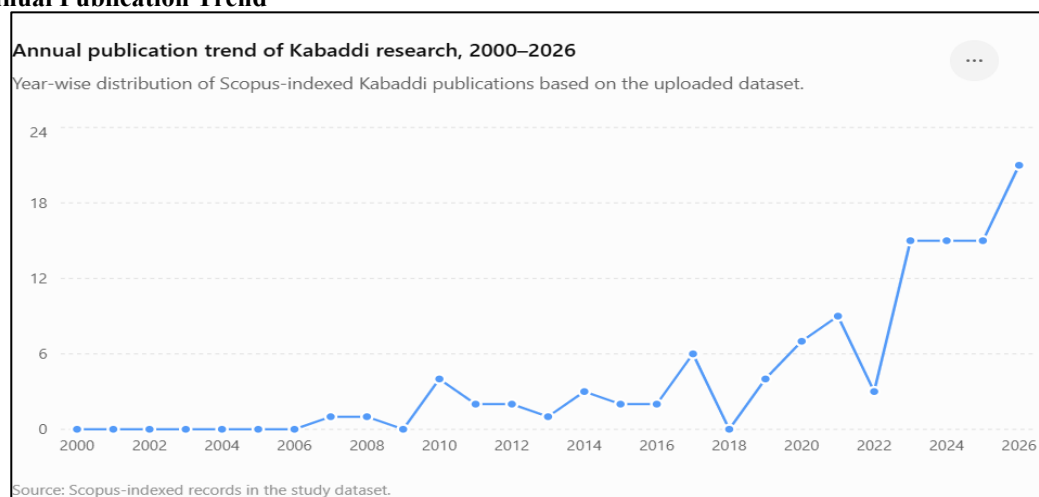
The selected records were analysed to examine annual publication growth, leading authors, journals, institutions, and countries, as well as citation patterns and collaboration networks. In addition, Author Keywords and Index Keywords were analysed using keyword co-occurrence techniques to identify major research themes and emerging areas in Kabaddi research.

2.5 Bibliometric Tools

VOS viewer was used for the visualization and mapping of bibliometric networks, including co-authorship, country collaboration, and keyword co-occurrence. Bibliometric/Biblioshiny was used for descriptive bibliometric analysis and thematic exploration. These tools are widely used for performance analysis and science mapping in bibliometric research (Donthu et al., 2021; Moral-Muñoz et al., 2020).

3. Results

3.1 Annual Publication Trend



The annual publication analysis indicates that Kabaddi research remained relatively limited during the initial part of the study period. No Scopus-indexed publications were identified between 2000 and 2006, while only one publication each was recorded in 2007 and 2008. Publication output subsequently increased, with fluctuations observed between 2010 and 2019. A more pronounced increase occurred from 2020 onward, rising from 7 publications in 2020 to 9 in 2021. Although publication output declined to 3 publications in 2022, it increased substantially thereafter, reaching 15 publications annually in 2023, 2024, and 2025. The highest annual output was observed in 2026, with 21 publications. Overall, the final dataset comprised 112 Scopus-indexed publications published between 2000 and 2026, indicating a marked expansion of scholarly research activity on Kabaddi, particularly during the most recent years.

3.2. Author Keyword Co-occurrence Analysis

Keyword co-occurrence analysis was conducted to identify major research areas and relationships in Kabaddi

literature. Author keywords were analysed to identify concepts considered central by researchers. The VOS viewer network in Figure 1 shows the relationships and thematic structure among these keywords. Larger nodes indicate higher keyword frequency, links represent co-occurrence relationships, and colours denote distinct keyword clusters.

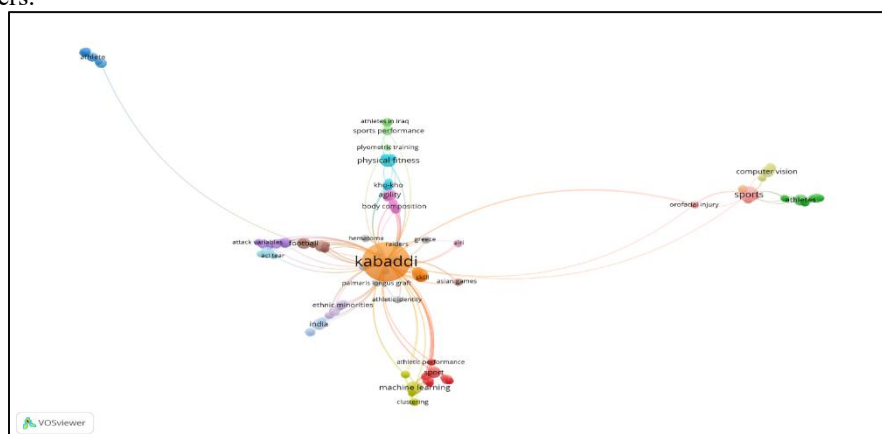


Figure 1. Co-occurrence Network of Author Keywords in Kabaddi Research

Figure 1 presents the co-occurrence network of author keywords in Kabaddi research. The network shows “kabaddi” as a central and highly connected keyword, reflecting its association with a wide range of research topics. Other frequently occurring and interconnected keywords include physical fitness, sports performance, body composition, agility, plyometric training, athletes, injury, and machine learning. The prominence and interconnection of physical fitness, agility, body composition, plyometric training, and sports performance indicate a substantial research focus on the physical and performance characteristics of Kabaddi players. In addition, the occurrence of keywords such as injury reflects research attention towards sports injuries and player safety. The presence of machine learning, computer vision, and data analytics-related terms further indicates the emergence of technology-oriented approaches within the broader Kabaddi research literature. The different clusters demonstrate that Kabaddi research has developed across multiple but interconnected areas of sports science, including physical fitness, performance, training, injury, and technological applications. Overall, the author-keyword co-occurrence network highlights the multidisciplinary nature of Kabaddi research and provides an overview of the major thematic areas represented in the literature.

3.3. All-Keyword Co-occurrence Analysis

To provide a broader view of the conceptual structure of Kabaddi research, co-occurrence analysis of all available keywords was conducted. This analysis identifies frequently occurring terms, their relationships, and major research areas within the literature. Figure 2 presents the VOS viewer network, where node size indicates keyword frequency, links represent co-occurrence relationships, and colours denote distinct keyword clusters.

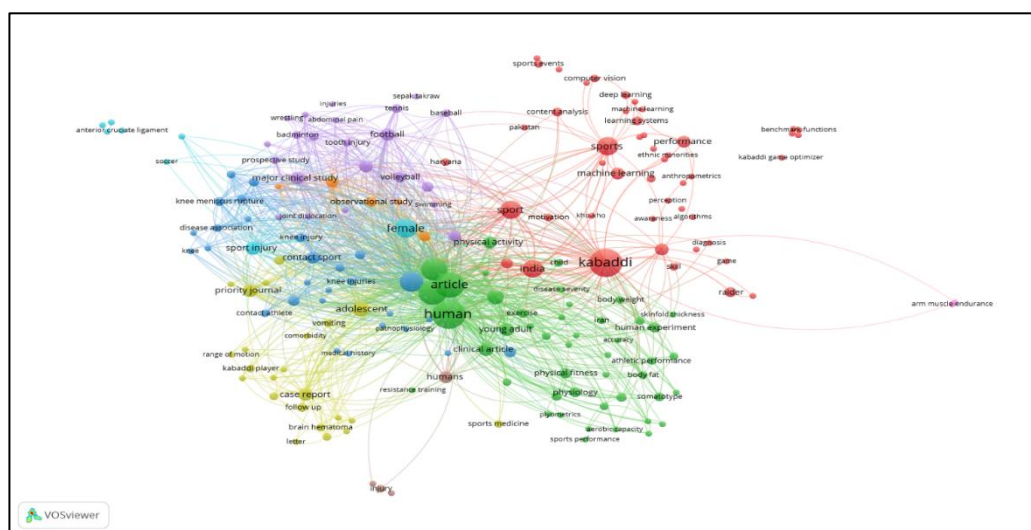


Figure 2. Co-occurrence Network of All Keywords in Kabaddi Research

Figure 2 illustrates the co-occurrence network of all keywords associated with Kabaddi research and provides a broader representation of the conceptual structure of the literature. The keyword “kabaddi” appears as the most prominent and central term, showing strong connections with several research areas. Other closely associated keywords include physical fitness, agility, body composition, plyometric training, sports performance, athletes, skill, raiders, and injury. The strong presence and interconnection of these terms indicate that a substantial proportion of Kabaddi research has focused on player characteristics, physical conditioning, sport-specific skills,

training methods, and performance outcomes. The network also demonstrates a distinct group of injury-related terms, including knee injury, sports injury, contact sport, anterior cruciate ligament, joint dislocation, and orofacial injury, reflecting the development of sports-injury and sports-medicine research within the Kabaddi literature. In addition, the occurrence of terms related to machine learning, computer vision, deep learning, content analysis, and sports data indicates the emergence of computational and technology-oriented approaches in sports research. Overall, the all-keyword co-occurrence network demonstrates that Kabaddi research encompasses interconnected areas of physical and performance sciences, sports injury and medicine, and technology-driven sports analysis, highlighting the multidisciplinary development of the field.

3.4. Scopus-Indexed Keyword Co-occurrence Analysis

For the Scopus-indexed keyword analysis, keywords available in the Scopus Index Keywords field of the retrieved records were used. These terms were analysed separately from Author Keywords to provide a standardized and database-indexed perspective of the subject areas represented in Kabaddi research. The selected index keywords were subjected to co-occurrence analysis using VOS viewer to identify frequently occurring terms, relationships, and thematic clusters.

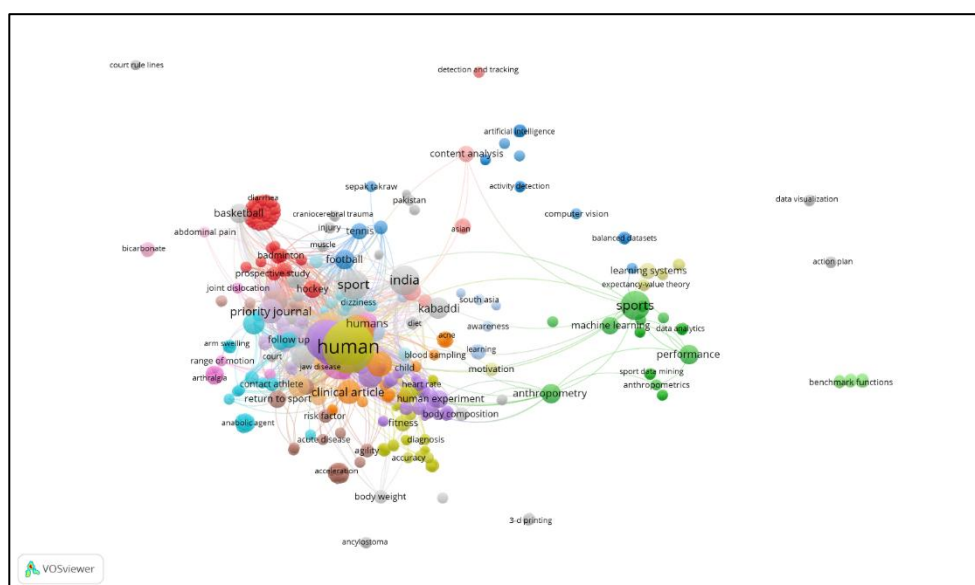


Figure 3. Co-occurrence Network of Scopus Index Keywords in Kabaddi Research

Figure 3 presents the co-occurrence network of Scopus-indexed keywords associated with the selected Kabaddi publications. The network contains several large and interconnected nodes, particularly “human,” “article,” “kabaddi,” “sport,” “female,” “physical activity,” and “India,” reflecting the broad subject coverage of the literature. A prominent group of terms is associated with sports medicine and injury research, including knee injury, sports injury, joint dislocation, contact sport, anterior cruciate ligament, disease association, and major clinical study. This cluster indicates considerable attention to injury-related and clinical aspects of Kabaddi and sports participation. Another group of interconnected terms is related to physical fitness and physiological characteristics, including physical fitness, body composition, physiology, aerobic capacity, plyometrics, anthropometrics, and athletic performance. These terms reflect research examining the physical and physiological characteristics of players and their relationship with sports performance. In addition, the network includes technology-oriented terms such as machine learning, computer vision, deep learning, content analysis, algorithms, and sports performance, indicating the presence of computational and analytical approaches within the broader sports research literature. Overall, the Scopus-indexed keyword network demonstrates that Kabaddi research extends beyond traditional physical education and encompasses interconnected areas of sports medicine, injury research, physiology, physical fitness, performance analysis, and emerging technology-based approaches.

3.5. Co-authorship Analysis

Co-authorship analysis was conducted to examine the collaborative structure of Kabaddi research and identify relationships among contributing researchers. Figure 4 presents the VOSviewer co-authorship network, where each node represents an author and connecting lines indicate co-authorship relationships. Larger nodes indicate greater author occurrence or contribution within the network, while different colours represent distinct collaboration clusters. Closer and more strongly connected nodes indicate stronger collaborative relationships.

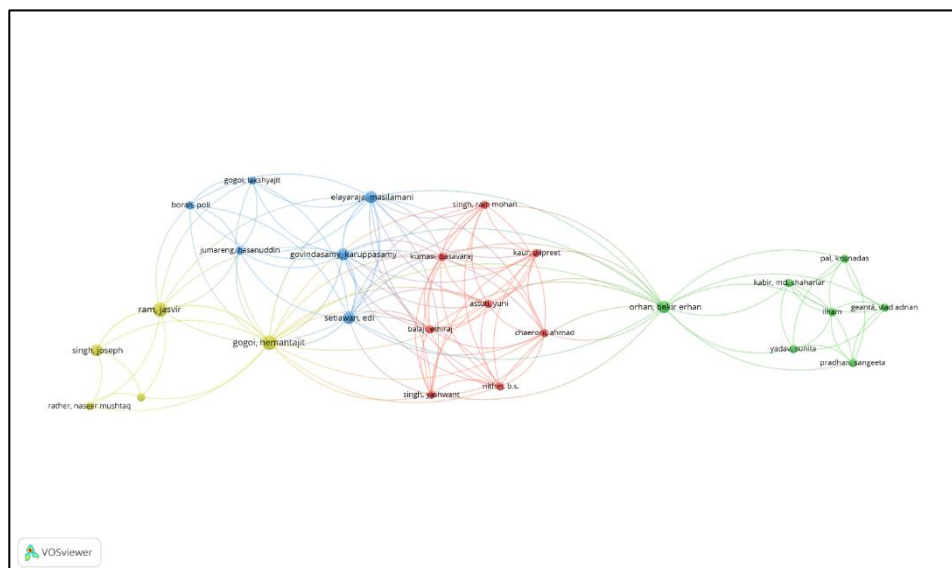


Figure 4 presents the co-authorship network of researchers contributing to Kabaddi literature.

The visualization demonstrates several identifiable collaboration clusters, indicating that Kabaddi research has developed through multiple groups of researchers rather than through a single interconnected author network. One collaboration cluster includes researchers such as Govindasamy, K., Kumarasamy, G., Gogoi, H., and Lakshajit, while another includes Singh, Ram Mohan, Kaur, Dilpreet, Nithin, B. S., and Singh, Yashwant. A further collaboration group includes researchers such as Orhan, Bekir Erhan, Pal, Krisnadas, Kabir, Md. Shahriar, and Yadav, Sunita. The links connecting the authors indicate co-authorship relationships, while the separation of authors into different coloured clusters reflects distinct collaborative groups within the literature. Authors occupying relatively central positions within their respective clusters show connections with multiple researchers and therefore occupy more connected positions in the collaboration network. Overall, the co-authorship network indicates that Kabaddi research has developed through multiple research teams and collaborative groups, reflecting an expanding pattern of scientific collaboration within the field.

3.6 Research Themes and Emerging Areas

The keyword co-occurrence analysis revealed several interconnected research themes within the Kabaddi literature. The major themes were related to physical fitness and physiological characteristics, sports performance and training, body composition and anthropometric characteristics, sports injuries and sports medicine, and technology-oriented approaches. Terms such as physical fitness, agility, body composition, plyometric training, sports performance, and athletic performance indicate a strong research focus on the physical and performance characteristics of Kabaddi players. Injury-related terms, including knee injury, anterior cruciate ligament, joint dislocation, and sports injury, reflect growing attention to injury prevention and sports medicine. In addition, the occurrence of machine learning, computer vision, deep learning, and data-related terms indicates the development of technology-oriented approaches in Kabaddi research. Overall, the findings suggest that Kabaddi research has expanded from traditional physical and performance-related studies towards a broader multidisciplinary research landscape incorporating injury science, sports medicine, and emerging technological applications.

4. Discussion

The present bibliometric study provides an overview of the development, research patterns, collaboration structure, and thematic landscape of Kabaddi research indexed in Scopus between 2000 and 2026. The findings indicate that Kabaddi research has developed across multiple interconnected areas of sports science. The keyword analysis showed a strong concentration on physical fitness, sports performance, agility, body composition, training, and athletic characteristics, suggesting that understanding the physical and performance demands of Kabaddi has remained an important research focus.

The findings also demonstrate the presence of injury-related research, particularly concerning knee injuries, anterior cruciate ligament injuries, joint dislocation, and other sports-related injuries. This indicates the relevance of injury prevention and sports medicine within Kabaddi research. In addition, the identification of machine learning, computer vision, and deep learning-related terms suggests the increasing integration of computational and technology-based approaches into sports research.

The co-authorship analysis further showed the presence of several collaborative research groups rather than a single highly integrated author network. These patterns indicate that Kabaddi research has developed through multiple research teams working across related but diverse areas. Overall, the findings demonstrate that Kabaddi research has a multidisciplinary structure involving physical fitness, performance science, training, injury research, sports medicine, and emerging technological applications.

5. Conclusion

The present bibliometric study examined the development of Kabaddi from an indigenous sporting tradition to an increasingly studied academic subject through Scopus-indexed literature published between 2000 and 2026. The findings demonstrate that Kabaddi research has expanded across multiple areas, particularly physical fitness, sports performance, training, body composition, injury, sports medicine, and technology-oriented approaches. The keyword co-occurrence analysis identified interconnected thematic clusters, while the co-authorship analysis revealed several collaborative research groups. Overall, the study provides a comprehensive overview of the intellectual and thematic structure of Kabaddi research and identifies important areas that may guide future research in the field.

The findings of the study have implications for researchers, coaches, sports scientists, and academic institutions involved in Kabaddi. The identified research themes may help researchers recognize established areas of study as well as comparatively less-explored areas. The prominence of physical fitness, performance, training, and injury-related research highlights the importance of integrated approaches to Kabaddi research. The presence of technology-oriented themes also indicates opportunities for applying computational methods, including machine learning and computer vision, to performance analysis and sports science. The identified collaboration patterns may further encourage interdisciplinary and international research collaborations in future Kabaddi studies.

The study has several limitations. First, the analysis was based exclusively on publications indexed in the Scopus database; therefore, relevant studies available in other databases may not have been included. Second, the search strategy was based on the keyword “Kabaddi” in the TITLE-ABS-KEY field, which may have excluded studies that examined Kabaddi but did not use the term in the title, abstract, or keywords. Third, the study covered the period from 2000 to 2026, and therefore publications outside this predefined period were not considered. Finally, bibliometric indicators such as publication counts, citations, and keyword frequencies reflect the characteristics of the indexed literature and may not fully represent the overall development of Kabaddi research.

Future research may focus on integrating traditional sports science approaches with emerging technologies in Kabaddi. Greater attention may be given to injury prevention, injury surveillance, performance monitoring, and evidence-based training strategies. The application of machine learning, computer vision, wearable technologies, and data analytics may provide new opportunities for objective performance assessment and tactical analysis. Future bibliometric studies may also incorporate multiple databases, longitudinal thematic analysis, and comparative analysis across different periods to provide a broader understanding of the evolution of Kabaddi research.

Conflict of Interest

The authors declare that there is no conflict of interest related to the publication of this study..

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