

Physical Condition Component Profile of Futsal Athletes: A Systematic Literature Review

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Abstract. This study aims to analyze and synthesize the physical fitness component profile of futsal athletes through a systematic literature review. The method employed was a systematic review of relevant scientific articles, focusing on data concerning speed, agility, strength, endurance, and flexibility. The findings indicate that futsal athletes exhibit a diverse physical fitness profile, with speed and agility generally ranging from good to very good, while aerobic endurance (VO2Max) and flexibility tend to be lower. Muscular strength, particularly explosive leg and core strength, varies from moderate to good. Significant differences were identified between male and female athletes, as well as between selected and non-selected players, with selected players demonstrating better sprint performance and heart rate efficiency. Athletes' nutritional intake is often suboptimal, with deficiencies in carbohydrates, as well as vitamins E and D, but excesses in protein and cholesterol. Integrated training programs with the ball showed high effectiveness in improving fitness, although infrastructure challenges persist. This study extends the understanding of futsal's physiological demands and influencing factors. The implications of this research highlight the importance of specific training programs and planned nutritional interventions to optimize performance and prevent injuries in futsal athletes.

Keywords: futsal, physical fitness, speed, agility, endurance

1 Introduction

Futsal is a rapidly growing, high-intensity team sport globally, demanding optimal physical performance from each athlete. The characteristics of the futsal game involve a series of explosive movements such as accelerations, decelerations, rapid changes of direction, jumps, and powerful kicks within a relatively short but intermittent match duration. Excellent physical condition components serve as a crucial foundation for futsal athletes to maintain game intensity, execute technical-tactical skills effectively, and minimize the risk of injury during competitions and training [1]. A deep understanding of futsal athletes' physical condition profiles facilitates the development of more specific and personalized training programs, contributing to overall team performance improvement. Success in achieving relevant physical condition standards directly affects a team's competitiveness at various levels, from amateur to professional. The ability of athletes to adapt to strict physical demands determines the sustainability of their careers and their self-development potential in this sport.

Optimizing physical condition is also positively correlated with better decision-making on the field, as fatigue can disrupt cognitive and perceptual processes. A comprehensive physical condition profile becomes an essential diagnostic tool for coaches and sports scientists. Various studies have examined the physical condition profiles and components of futsal athletes in diverse geographical contexts and competition levels. These studies often focus on aspects such as muscle strength, sprint speed, aerobic and anaerobic endurance, agility, flexibility, and body composition [2, 3]. Lower limb explosive strength, for instance, has been identified as an important predictor of jumping and sprinting performance, while agility is an essential adaptive ability for maneuvering in the tight spaces of a futsal court. Aerobic and anaerobic endurance analysis provides insights into the athlete's capacity to sustain high intensity and recover between explosive activities. Body composition measurements, such as body fat percentage and muscle mass, are also frequently conducted to identify potential advantages or areas needing improvement [4].

Diverse research methodologies, ranging from standard field tests to more advanced laboratory testing, have been applied to measure these components objectively. Current research trends show an interest in the interaction between physical components and their impact on player position-specific performance. Significant variations in findings often emerge among previous studies investigating futsal athletes' physical condition profiles. These differences can be attributed to various factors, including sample characteristics (age, gender, experience level, playing position), the measurement protocols used, and the training and competition environment [5, 6]. For example, the definition and measurement methods of agility may vary across studies, making direct comparisons challenging. This inconsistency in findings complicates the identification of a standard physical condition profile.

2 Methods

This study applied a systematic literature review (SLR) method following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The four core stages of PRISMA—identification, screening, eligibility, and inclusion—serve as the main framework for this process. The search for scientific articles was conducted through the OpenAlex database, an open index aggregating metadata from Crossref, DOAJ, PubMed, and various institutional and publisher repositories. The journal accreditation of each identified article was verified using the SINTA journal directory (levels S1–S6) and the Scopus journal list (quartiles Q1–Q4) through ISSN validation. The search process utilized a combination of specific keywords and Boolean operators: "physical condition" AND "futsal athletes"; futsal AND "physical components" AND "athlete profile"; "futsal player" AND "physical fitness" AND (profile OR assessment); and "systematic review" AND futsal AND "physical condition". The analyzed articles spanned publications between 2015 and 2026 [7].

Inclusion and exclusion criteria were strictly established to ensure the relevance and quality of the analyzed articles, as presented in Table 1.

Table 1. Methods Criteria

Criteria	Inclusion	Exclusion
Document type	Scientific journal articles or conference proceedings.	News, blogs, opinions, books, or book chapters.
Article language	English or Indonesian.	Languages other than English or Indonesian.
Full text	Full text of the article is available.	Full text of the article is not available.
Main topic	Discusses physical condition components or physical profiles of futsal athletes.	Topics irrelevant to the physical condition components of futsal athletes.
Research subject	Research subjects are futsal athletes.	Research subjects are not futsal athletes or focus on other sports.
Publication year	Articles published between 2015-2026.	Articles published outside the 2015-2026 range.

The article selection process followed the PRISMA flow, starting with the identification of 464 records from search sources. A total of 100 duplicates were removed, leaving 364 unique articles. The title and abstract screening phase eliminated 334 articles. Subsequently, 30 full-text articles were assessed for eligibility; no articles were excluded at this stage. A total of 30 articles were finally selected for in-depth analysis [8].

Article quality assessment became a crucial stage in ensuring the validity of the review findings. Each article that passed the eligibility stage was independently evaluated based on five main criteria: topic relevance, methodological clarity, data/sample transparency, clarity of results, and the article's scientific contribution. The assessment used a three-point Likert scale (1=poor, 2=fair, 3=good). Articles with low-quality scores were excluded from the review. All 30 selected articles for the final analysis demonstrated a perfect average quality score of 3 out of 3, indicating high-quality research and robust methodology [9].

The data extraction process involved gathering relevant information from the selected articles. The extracted data included bibliographic details, study design, sample characteristics, measured physical condition components, measurement instruments, and key outcome profile findings. Data analysis utilized a thematic synthesis approach, identifying patterns, key themes, and research gaps regarding the physical condition component profile of futsal athletes. The thematic synthesis allowed the organization of findings from various studies into meaningful categories, providing a comprehensive overview of futsal athletes' physical conditions based on the literature [1].

3 Results

3.1 Article Selection Results

The article selection process in this systematic review followed the PRISMA flow. Initial identification yielded 464 articles from various databases. After eliminating 100 duplicates, 364 articles remained. Title and abstract screening excluded 334 articles that did not meet the

inclusion criteria, leaving 30 articles. All 30 articles were assessed for full-text eligibility and all met the requirements, thus these 30 articles constituted the final analysis in this systematic review [10].

3.2 Article Characteristics

The main characteristics of the 30 selected articles are summarized in Table 2.

Table 2. Findings

Aspect	Finding
Final number of articles	30
Year range	2015–2026
Dominant countries	Indonesia, Spain, Taiwan, Poland
Dominant methods	Descriptive quantitative, Quantitative, Descriptive, Survey
Dominant themes	Physical Condition Component Profile of Futsal Athletes, Comparisons and Futsal-Specific Performance Indicators, Supporting and Inhibiting Factors of Physical Condition

3.3 Publication Trends

Publication trends indicate a significant increase. From only 1 article in 2015 and 2019, the number rose to 2 articles in 2020 and 2021. A larger surge occurred in 2022 with 5 articles, and 2023 with 4 articles. The positive trend continues with a projection of 4 articles in 2024, 5 articles in 2025, and peaking at 6 articles in 2026, indicating growing research interest in this field [11].

3.4 Data Extraction Table

The data extracted from each of the 30 selected articles are summarized in Table 3.

Table 3. Results (Summary of 30 Studies)

No	Author (Year)	Country	Main Findings
1	González-Fernández et al. (2024) [2]	Spain	Baseline body composition and overall physical fitness measures might be crucial factors for match running demands during congested futsal match periods.
2	Subekti et al. (2022) [1]	Indonesia	There is an overall difference where male athletes' physical abilities are higher than females in various physical and physiological components.

No	Author (Year)	Country	Main Findings
3	Chiu et al. (2024) [12]	Taiwan	The overall correlation observed among anthropometry, body composition, physical fitness, and HRR was inconsistent across all matches and substitutions, but moderate-to-high intensity accelerations showed a negative correlation in the final match.
4	Wafidturrohman et al. (2026) [13]	Indonesia	Cardiorespiratory endurance is mostly classified as fair, anaerobic endurance as good, speed as fair, agility as good, and eye-foot coordination as fair.
5	Silva et al. (2022) [3]	Taiwan	Selected players were faster in 15m sprint with the ball and 30m, and showed greater HRaverage and time above 90% HRmax during the training camp compared to non-selected players.
6	Ruiz-Pérez et al. (2023) [14]	Spain	Only isometric hip adduction strength and the unilateral ratio for the non-dominant leg showed significant differences between injured and non-injured players.
7	Misbah et al. (2026) [15]	Indonesia	Players possess explosive leg muscle strength and sprint speed in the good category, agility in the fair category, upper body muscle strength in the fair category, but VO ₂ Max is mostly in the poor category.
8	de Baranda et al. (2015) [16]	Spain	The study defined optimal ROM ranges for field players and goalkeepers across various lower limb muscle groups.
9	Perdana et al. (2022) [5]	Indonesia	Physical condition factors of abdominal muscle strength and flexibility have excellent average abilities, while endurance and reaction time are very poor.
10	Söğüt et al. (2021) [4]	Turkey	Girls were more advanced in maturity and had higher BMI and body fat percentage than boys, while boys outperformed girls in all fitness and sports skill assessments except for the countermovement jump.
11	Al Haqiqi et al. (2022) [17]	Indonesia	Arm and abdominal muscle strength are in the excellent category, leg muscle strength is moderate, speed is poor, and aerobic endurance is very poor.
12	Gogojewicz et al. (2023) [18]	Poland	Energy availability in the diet was lower than recommended, carbohydrate consumption was low, Vitamin E and D intake was inadequate, while protein and cholesterol intake were higher than recommended.

No	Author (Year)	Country	Main Findings
13	Aziz et al. (2024) [19]	Indonesia	The physical condition of MIN 03 Muko-Muko futsal athletes based on T-Scores is in the good (40%), moderate (40%), poor (10%), and very poor (10%) categories, with an overall average in the moderate category.
14	Ciekot-Softysiak et al. (2024) [6]	Poland	No significant exercise-induced differences in RBC parameters were found between athlete groups, and RBC, Hb, and Hct increased significantly during incremental physical exercise, returning rapidly to rest values after the test.
15	Jaya et al. (2025) [20]	Indonesia	Athletes' physical condition is generally in the very poor to fair category, with major weaknesses in speed and endurance.
16	Suryadi et al. (2023) [21]	Indonesia	There is a significant difference between the physical fitness of football (average 15.1) and futsal (average 11.75) extracurriculars.
17	Alviana (2026) [22]	Indonesia	Athletes' average BMI is in the normal category, speed and power in moderate, muscle strength varies from moderate to good, and cardiorespiratory endurance in moderate, indicating a need for improved aerobic endurance and muscle strength.
18	Sulaeman & Jayadilaga (2023) [23]	Indonesia	Athletes' average endurance is in the poor category, explosive power in good, speed and agility in perfect, and strength in the fair category.
19	Killat et al. (2021) [24]	Indonesia	The physical condition profile of Cianjur futsal athletes in 2021 is in the good category overall, with 94% in the good category and 6% in the moderate category.
20	Lukman et al. (2025) [25]	Indonesia	The physical fitness of MA Nurul Islam Karancempaka futsal players is in the moderate to good category, with average VO ₂ max in the moderate category, requiring specific training programs to improve aerobic capacity and sprint speed.
21	Ariefyanto et al. (2026) [26]	Indonesia	Overall physical condition is classified as Fair, with endurance in the Good category, speed and agility in Excellent, abdominal muscle endurance in Fair, and flexibility in Very Poor.
22	Phitaloka et al. (2020) [27]	Indonesia	There is no significant effect of training periodization in the general preparation phase (TPU) on futsal athletes' alactic anaerobic endurance, with a decrease of -2.53% even occurring.

No	Author (Year)	Country	Main Findings
23	Supriyanto & Billiandri (2026) [28]	Indonesia	Integrated ball training showed significant improvement in the experimental group across all tests (50-meter sprint, Illinois Agility Run, and 2400-meter run), proving its superiority over traditional methods.
24	Kurniasandi et al. (2025) [29]	Indonesia	Futsal athletes outperformed the general adolescent population in most fitness components, but their performance was significantly lower than elite athletes, particularly in endurance and lower limb strength.
25	Putra et al. (2026) [30]	Indonesia	Students' physical fitness levels are categorized as good (30%), moderate (60%), and poor (10%), while dominant passing skills are good (65%), and dribbling (55%) and shooting (50%) are moderate.
26	Hafid et al. (2025) [7]	Indonesia	Overall physical condition is categorized from moderate to excellent, with agility and lower body explosive power in good to excellent, while speed and cardiovascular endurance are in the moderate category.
27	Ribeiro et al. (2020) [31]	Portugal	Players increased the distance covered per minute at 12-18 km/h in the second half, and high speed, sprints, decelerations, and metabolic power were the variables that most differentiated the load intensity of elite futsal players.
28	Anwar (2019) [32]	Indonesia	The physical condition profile of PORPROV futsal athletes in Bangkalan Regency in 2019 showed agility and flexibility in the excellent category, speed and power in good, while endurance was in the moderate category.
29	Ramadan & Mukarromah (2025) [33]	Indonesia	The average VO2Max value of Comal Futsal Academy athletes was 46.2 ml/kg/min, and overall their VO2Max endurance condition can be considered good.
30	Putra & Anggita (2022) [9]	Indonesia	The strength and conditioning program is considered good and meets the athletes' needs, although the facilities are inadequate, and 62% of male futsal athletes in Tangerang Regency achieved the physical trainer's target for aerobic endurance (VO2 Max), enhancing their achievements.

3.5 Physical Condition Component Profile of Futsal Athletes

Futsal athletes exhibit a varied physical condition profile. Speed and agility are often good to excellent, representing adaptations to the sport's demands [1, 2, 5]. However, aerobic

endurance (VO₂Max) and flexibility tend to be lower or suboptimal [4, 15]. This indicates a need for enhanced cardiorespiratory capacity to support intense matches and flexibility for injury prevention. Muscle strength, especially explosive leg and abdominal muscles, is generally moderate to good, which is crucial for sprinting, jumping, and shooting [15]. Monitoring body composition, including BMI, is also vital for performance optimization and nutritional interventions.

3.6 Comparisons and Futsal-Specific Performance Indicators

Significant differences exist in physical abilities. Male athletes generally outperform females in many physical aspects [16]. Selected players show better sprint performance and more optimal heart rate (HR) responses compared to non-selected players [3]. Futsal athletes outperform the general population in fitness but remain below elite athletes, especially in cardiorespiratory endurance and lower limb strength [12]. Correlations between physical components are not always consistent across studies. Only isometric hip adduction strength and the non-dominant leg unilateral ratio significantly differentiate injured and non-injured players [14], which is important for injury prevention programs.

3.7 Supporting and Inhibiting Factors of Physical Condition

The nutritional intake of futsal athletes is often suboptimal, hindering performance. Many athletes have lower energy availability and carbohydrate consumption than recommended, leading to early fatigue and slow recovery [13]. Essential micronutrient intake such as vitamins E and D is also inadequate in many athletes [18], negatively impacting health and performance. Conversely, protein and cholesterol consumption tends to exceed recommendations [17]. The diets of futsal athletes require attention and nutritional intervention to achieve a proper balance of macro- and micronutrients.

3.8 Effectiveness and Challenges of Training Programs

The effectiveness of training programs varies. Integrated ball training is highly effective in improving futsal-specific speed, agility, and endurance [15, 19]. However, training periodization during the general preparation phase does not necessarily have a significant effect on alactic anaerobic endurance [6], highlighting the need for a more focused approach. Strength conditioning programs are generally good and suited to needs, but inadequate training facilities and equipment remain a primary obstacle in achieving optimal physical targets [13].

3.9 Research Gaps

Although many studies profile the physical conditions of futsal athletes, research gaps remain. Long-term intervention studies that thoroughly and consistently test the effectiveness of specific training programs are needed, ideally over a full season or more [2]. Further research is also required to explore non-physical factors such as psychological aspects (motivation, mental toughness), optimal recovery strategies (nutrition, sleep), and the relationship between physical condition profiles and long-term injury incidence [12, 14]. Prospective cohort studies could help identify injury risk factors and develop more effective prevention programs.

4 Discussion

4.1 Physical Condition Component Profile of Futsal Athletes

Futsal athletes present a diverse physical condition profile reflecting the intermittent, high-intensity nature of the sport. Speed and agility often fall into the good to excellent categories, which are essential components for accelerations, decelerations, and rapid changes of direction during play. Muscular strength, particularly explosive leg strength for jumping and sprinting, as well as abdominal muscle strength for core stability, is generally at moderate to good levels among futsal athletes. Aerobic endurance (VO2Max) and flexibility show tendencies toward lower or suboptimal levels. This varied physical condition necessitates a targeted training approach to optimize on-court performance, especially given the need for cardiorespiratory endurance to maintain game intensity throughout the match [17].

Body composition assessment through BMI is also an integral part of the evaluated profile. Futsal athletes' fitness status is heavily influenced by the ratio of muscle mass to body fat, which directly relates to movement efficiency and injury risk mitigation. This overall profile underscores the need for continuous improvements in cardiorespiratory endurance and comprehensive muscle strength to reach peak performance. A profound understanding of this profile is essential for coaches in designing specific and effective training programs, ensuring athlete development aligns with the dynamic demands of futsal [25].

4.2 Comparisons and Futsal-Specific Performance Indicators

The physical capabilities of futsal athletes exhibit significant differences based on gender and team selection status. Male athletes generally show superiority in multiple physical condition components compared to female athletes, a finding consistent with inherent physiological differences between the sexes. Clear distinctions also appear between players selected for the team and non-selected ones; selected players consistently display better sprint performance and a more efficient heart rate (HR) response during intense activity [4]. These differences highlight the importance of speed and cardiovascular capacity as determining factors in futsal athlete selection.

While futsal athletes generally surpass the general population in physical condition, their performance still trails behind elite athletes in other sports, particularly in endurance and lower limb strength. This gap underscores the potential for improvement through more structured and specific training programs targeting aerobic capacity and explosive strength enhancements. Relationships among physical components are not always consistent across studies, reflecting the complexity of interactions between physical attributes. Interestingly, isometric hip adduction strength and the unilateral ratio of the non-dominant leg were identified as significant indicators that differentiate injury-prone players from uninjured ones, providing valuable insights for injury prevention strategies [3].

4.3 Supporting and Inhibiting Factors of Physical Condition

Nutritional intake plays a crucial role in supporting or hindering the physical condition of futsal athletes. Study findings indicate that the dietary patterns of futsal athletes are often suboptimal. Energy availability and carbohydrate consumption—the primary energy source during intense physical activity—are reported to be lower than recommended, potentially

affecting performance capacity and recovery. Deficiencies are also identified in the inadequate intake of vitamins E and D, both of which are critical for immune function and bone health [18].

Protein and cholesterol intake among futsal athletes tends to be higher than recommended. Although protein is vital for muscle recovery and growth, excessive intake without corresponding needs can burden the kidneys, while high cholesterol poses long-term cardiovascular health risks [18]. This nutritional imbalance highlights the urgency for greater attention to the dietary habits of futsal athletes. Planned nutritional interventions and dietary education are highly necessary to ensure athletes receive optimal nutritional support, fostering peak physical condition and preventing potential performance hindrances and future health issues.

4.4 Effectiveness and Challenges of Training Programs

The effectiveness of training programs on futsal athletes varies depending on the design and focus of the intervention. Several studies indicate that integrated ball training can significantly improve various fitness components, including speed, agility, and endurance. This approach directly mimics the demands of futsal, thereby generating more specific and functional adaptations in athletes [1]. Training periodization during the general preparation phase does not necessarily exert a significant influence on alactic anaerobic endurance, suggesting that this preparatory phase might require a more specific focus or different intensity to achieve desired adaptations in this energy system.

Strength conditioning programs are generally considered good and appropriate for the physiological needs of futsal athletes. These programs are designed to enhance explosive strength and muscular endurance, both essential for futsal performance. However, implementing these programs often faces substantive challenges. Inadequate facilities and infrastructure represent a major constraint in achieving optimal physical targets, impeding the application of modern and high-intensity training methods [15]. Such limitations frequently force coaches to adapt training programs, potentially reducing effectiveness and slowing athlete development. Solutions demand investment in sports infrastructure and the development of innovative training programs to overcome these limitations.

4.5 Research Contributions and Gaps

This systematic review provides a comprehensive overview of the physical condition component profiles of futsal athletes, identifying current research trends and commonly used measurement methods. The article specifically synthesizes findings on strength, speed, agility, endurance, and flexibility, along with the factors influencing these performances. The growing volume of research over the past five years (2020-2024), as evidenced by the increase in publications from two articles in 2020 to four in 2024, indicates an expanding interest in futsal's physiological profile. The identification of futsal-specific performance indicators, such as differences between selected and non-selected players, and injury-triggering factors, offers valuable insights for talent development and injury prevention strategies [14].

Although numerous studies have profiled the various physical condition components of futsal athletes, significant research gaps remain. Long-term intervention studies that thoroughly and consistently examine the effectiveness of specific training programs, such as integrated training or strength programs, are still relatively limited. Most studies tend to focus on short durations or impacts on specific physical components, lacking exploration of long-term adaptations. Further research is necessary to comprehensively explore non-physical factors,

such as psychological aspects influencing performance and recovery, as well as optimal recovery strategies following matches or intensive training [12].

Research gaps also encompass more detailed relationships between specific physical condition profiles and long-term injury incidents in futsal athletes. Prospective studies tracking athletes over multiple competitive seasons could provide a deeper understanding of injury predictors and the effectiveness of preventive interventions. Nutritional aspects, particularly diet personalization and supplementation, also require further research to optimize performance and recovery. Future research agendas should prioritize long-term intervention studies, the integration of psychological factors, and in-depth analyses of the relationship between athletes' physical condition and holistic health [20].

5 Conclusion

This systematic review concludes several essential aspects regarding the physical condition component profile of futsal athletes. Futsal athletes face high physical demands, particularly in aerobic endurance, speed, agility, leg strength, and explosive power. These components are crucial for optimal performance in a sport characterized by high intensity and rapid changes of direction. The measurement of these physical components frequently utilizes standard protocols. Aerobic endurance is measured via the bleep test (multistage fitness test) or the Yo-Yo Intermittent Recovery Test. Linear speed is evaluated using 5-meter and 20-meter sprints, while agility is assessed via the T-test or Illinois Agility Test. Leg strength and explosive power are evaluated through squat jumps, countermovement jumps, and leg presses.

Research trends over the past five years highlight playing-position-specific training specifications and training periodization to optimize athletes' physical profiles. The use of wearable technology for monitoring training loads and physiological responses is also expanding. However, current studies still leave substantial research gaps. The determination of physical condition profiles for junior and female futsal athletes remains minimal, while the impact of nutritional and psychological factors on physical performance is rarely studied in depth. Comparisons of physical profiles across different leagues or competition levels also require further exploration.

Future research should focus on longitudinal studies tracking the development of futsal athletes' physical condition profiles across various age groups. Expanding the geographical scope of studies to developing nations will enrich the global perspective on athlete profiles. Analyzing the impact of specific training interventions on improving particular physical components, including associated potential injury risks, remains a critical area. The development of predictive performance models based on combinations of physical components and external factors will also significantly contribute to the advancement of futsal.

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