ISSN: xxxx-xxxx

SPIN: Journal of Sport Performance Indonesia

Published by Media Publikasi Cendekia Indonesia

Journal homepage: www.journalmpci.com/index.php/spin/index

Identification of Anthropometric Profiles and Physical Fitness Components of Male Indoor Hockey Athletes in Banten Province

Sendy Mohamad Anugrah[1], Dadan Resmana[2], Fahmi Fadhiil[3], Irwan Hermawan[4], Muhamad Fahmi Hasan[5]

[1]Universitas Sultan Ageng Tirtayasa, sendymohamadanugrah@untirta.ac.id

[2]Universitas Negeri Jakarta, dadanresmana@unj.ac.id

[3]Universitas Cenderawasih, fahmifadhiil@fik.uncen.ac.id

[4]Universitas Garut, iwan.hermawan@uniga.ac.id

[5]Institut Teknologi Bandung, fahmi.hasan@itb.ac.id

(sendymohamadanugrah@untirta.ac.id, +6281321148675)

ABSTRACT

The global evolution of indoor hockey has significantly elevated the physical demands placed on athletes, necessitating specific anthropometric characteristics and comprehensive physical fitness components. These traits support high-intensity gameplay, which involves rapid direction changes and relies on combined aerobic and anaerobic capacities. However, scientific data comprehensively documenting the anthropometric profiles and physical fitness levels of indoor hockey athletes in Indonesia, particularly at the provincial level, remain remarkably limited. Consequently, this study aimed to identify and map the anthropometric profiles and physical fitness components of male indoor hockey athletes from Banten Province, serving as a foundational basis for evaluating their physical condition. Employing a quantitative approach with a descriptive cross-sectional design, this research involved 11 male indoor hockey athletes from the Banten provincial team, selected through a total sampling technique. Data collection utilized standard anthropometric measurements alongside a structured series of physical fitness tests assessing flexibility, agility, balance, reaction time, muscular strength, power, core stability, and cardiorespiratory endurance. Descriptive statistical analysis revealed that the athletes possessed a normal anthropometric profile, highlighting an average height of 167.73 cm, body weight of 62.73 kg, and a body mass index of 22.12 kg/m². Furthermore, the athletes demonstrated commendable capabilities in agility, muscular strength, lower-body power, and core stability. Conversely, their average VO_2max value of 46.91 ml/kg/min indicated a moderate level of cardiorespiratory endurance. Ultimately, these empirical findings offer vital insights into athletes' physical profiles, establishing a critical benchmark for designing evidence-based, targeted training programs.

Keywords : Anthropometry, Physical Fitness, Indoor Hockey

INTRODUCTON

The global development of indoor hockey indicates an increase in game intensity, which demands specific anthropometric profiles and physical fitness components—such as aerobic-anaerobic endurance, explosive strength, agility, and neuromuscular stability—as determinants of performance and injury prevention; recent studies confirm that anthropometric characteristics and physical capacities are significantly associated with hockey-specific performance, in both ice hockey and field hockey (Gürkan et al., 2025; Hiepen et al., 2025; Rice et al., 2024; Rosanas-Orra et al., 2026). Globally, the physiological demands of indoor hockey—played in confined spaces with rapid changes of direction—elevate the requirement for power and repeated sprint ability, as highlighted in studies examining the relationship between physical testing and match performance (Rice et al., 2024), as well as strength adaptations resulting from functional resistance training in hockey players (Gürkan et al., 2025). Furthermore, anthropometric factors have been shown to correlate with injury risk and functional stability (Cejudo et al., 2024; Hiepen et al., 2025).

In the national context, research regarding the physical condition profiles of Indonesian hockey athletes remains limited and predominantly focuses on outdoor hockey (Putra & Hariadi, 2025). Consequently, specific data on indoor hockey, particularly concerning provincial-level male athletes such as those in Banten, has not been comprehensively documented. Recent international studies also tend to investigate female athletes (Jiménez-Casquet et al., 2024; Puchalt-Urbano et al., 2025; Wörner & Eek, 2025) or youth populations (Cejudo et al., 2024), and focus more heavily on ice hockey rather than synthetic court-based indoor hockey. Therefore, a research gap exists in the form of a lack of integrated mapping between anthropometric profiles and comprehensive physical fitness components among adult male indoor hockey athletes within the context of regional competitions.

Based on these research gaps, this study explicitly aims to analyze and map the anthropometric profiles (height, weight, body mass index, and body composition) alongside key physical fitness components (cardiorespiratory endurance, muscular strength and explosive power, agility, speed, and flexibility) of male indoor hockey athletes in Banten Province as a foundation for performance evaluation. Theoretically, this study contributes to strengthening the sports science framework regarding the relationship between morphological characteristics and physical capacities in high-intensity intermittent sports, while enriching a body of literature previously dominated by studies on ice hockey or female athletes. Practically, the findings are expected to serve as a basis for designing evidence-based training programs, athlete selection processes, and injury prevention strategies for indoor hockey development at both the regional and national levels.

METHODS

This study employs a quantitative approach with a descriptive research type and a cross-sectional design, aiming to objectively describe the anthropometric profiles and physical fitness

components of male indoor hockey athletes in Banten Province during a specific measurement period (Creswell & Creswell, 2023). This design was selected because it is suitable for mapping athletes' physical characteristics without variable manipulation, and it is effective in generating representative numerical data for a limited population (Thomas et al., 2023).

The research population comprised all active registered male indoor hockey athletes in the Banten Province team in 2025, totaling 11 athletes. The sampling technique utilized was non-probability sampling with a total sampling method, meaning all members of the population were used as the research sample. The selection of total sampling was based on the relatively small and homogeneous population size; thus, all athletes were included to enhance the accuracy of the data description and minimize selection bias (Sugiyono, 2022). Based on these data, the number of participants in this study was 11 athletes.

Data collection was conducted through direct measurement (field testing) and structured observation using standard fitness test instruments. The measured anthropometric variables included height and weight using a stadiometer and a calibrated digital scale, from which the Body Mass Index (BMI) was calculated. Physical fitness components were measured using the following series of tests: (1) Sit and Reach Test to measure flexibility; (2) Side Step Test to measure agility; (3) Stork Stand Test to measure static balance; (4) Whole Body Reaction Test to measure reaction speed; (5) Hand Dynamometer Test to measure grip strength as an indicator of muscular strength; (6) Hurdle Jump Test to measure power and coordination; (7) Core Stability Test to measure core muscle endurance; (8) Side Throw Medicine Ball Test to measure arm muscle explosive power and body rotation; (9) Vertical Jump Test to measure leg muscle explosive power; and (10) Bleep Test (Multistage Fitness Test) to measure cardiorespiratory endurance and estimate VO_2max. All testing procedures referred to the sports fitness measurement standards recommended by the American College of Sports Medicine (Medicine, 2022).

The test instruments utilized are standard tools widely used in sports research and are reported to have good validity and reliability (Faylia & ., 2025; Turan et al., 2022). To ensure data consistency, a reliability test was conducted using the test-retest method on three athletes with a 7-day interval. Content validity was tested through expert judgment involving two academics in the field of sports coaching and one nationally certified hockey coach.

The research procedure was carried out in stages. The initial stage involved coordination with team management and coaches to obtain research permission. Subsequently, athletes were briefed on the research objectives and procedures, followed by the signing of an informed consent form. Anthropometric measurements were conducted in the morning prior to training. Physical fitness testing was executed in a single structured session with a test sequence that considered fatigue management principles; it began with tests requiring high concentration and low load (reaction and balance), followed by strength and power tests, and concluded with an endurance test (bleep test). A rest period of 3–5 minutes was provided between each test to prevent excessive fatigue accumulation.

Data analysis employed descriptive statistical analysis in the form of mean values, standard deviations, minimum, and maximum values to describe the athletes' anthropometric and physical fitness profiles. The data were also classified into fitness norm categories according to applicable reference standards. The Shapiro-Wilk normality test was used because the sample size was less than 50 subjects. Data analysis was performed using IBM SPSS Statistics version 26 and Microsoft Excel 365 as data processing support tools. This approach aligns with the nature of quantitative descriptive research, which focuses on mapping population characteristics systematically and objectively (Field, 2023). Based on this methodological design, this study is expected to yield accurate, reliable, and relevant data to support the development of training programs and indoor hockey coaching at the provincial level.

RESULTS

This study aims to describe the anthropometric profiles and physical fitness components of male indoor hockey athletes in Banten Province. Data collection was conducted through direct measurements of 11 athletes using a series of standardized fitness tests. Data analysis employed descriptive statistics, including mean, standard deviation (SD), minimum, and maximum values. The results of the anthropometric measurements for the Banten Province indoor hockey athletes are presented in **Table 1**.

Table 1. Descriptive Statistics of Athletes' Anthropometric Profiles

Variable	Mean	SD	Min	Max
Height (cm)	167.73	3.85	165	176
Weight (kg)	62.73	6.42	54	73
BMI (kg/m²)	22.12	2.12	19.49	24.96

Based on **Table 1**, the average height of the athletes is 167.73 cm, with a minimum of 165 cm and a maximum of 176 cm. The athletes' average body weight is 62.73 kg, while the mean body mass index (BMI) is 22.12 kg/m², ranging from 19.49 to 24.96 kg/m².

In addition to the anthropometric profile, this study assessed various physical fitness components, including flexibility, agility, balance, reaction speed, muscular strength, power, and cardiorespiratory endurance. These measurements aimed to provide a comprehensive overview of the athletes' physical condition, which plays a crucial role in supporting indoor hockey performance. The results of the physical fitness component measurements for the Banten Province indoor hockey athletes are presented in **Table 2**.

Table 2. Descriptive Statistics of Athletes' Physical Fitness Components

Fitness Component	Mean	SD	Min	Max
Flexibility (cm)	22.27	2.33	19	25
Agility (rep)	28.27	3.85	20	34
Balance (sec)	25.09	14.98	9	50

Fitness Component	Mean	SD	Min	Max
Reaction Speed (sec)	0.38	0.06	0.297	0.476
Grip Strength (kg)	41.91	6.24	35	55
Leg Muscle Endurance (rep)	89.36	30.22	59	150
Core Stability (level)	11.73	0.90	9	12
Medicine Ball Throw Power (m)	2.85	0.55	2.0	4.0
Leg Power (w/kg)	124.27	10.55	112	140
VO_2Max (ml/kg/min)	46.91	4.35	42	55

The results in **Table 2** indicate that the athletes' average flexibility is 22.27 cm, agility is 28.27 repetitions, and balance is 25.09 seconds. The mean reaction speed is 0.38 seconds, while grip strength reaches an average of 41.91 kg. Leg muscle endurance averages 89.36 repetitions, with a maximum value of 150 repetitions. Furthermore, the mean core stability score is 11.73 levels.

DISCUSSION

Indoor Hockey Athletes' Anthropometry

The results showed that the male indoor hockey athletes of Banten Province possess a relatively proportional anthropometric profile, with a mean body mass index (BMI) of 22.12 kg/m², which falls within the normal category. This condition indicates that the majority of the athletes have a fairly ideal body composition to support high-intensity sports activities such as hockey. From the perspective of sports coaching science, a balanced body composition plays a crucial role in enhancing the biomechanical efficiency of movements, acceleration capabilities, and agility during matches.

Previous studies have demonstrated that anthropometric characteristics are associated with the physical performance of hockey players. Sharma et al. (2012) found that anthropometric variables, such as height and body composition, correlate with several physical fitness components in professional hockey players. Furthermore, Lemos et al. (2017) explained that an optimal anthropometric profile can improve specific performance in field hockey; thus, the athletes' anthropometric profile in this study can be considered adequate to support the physical demands of indoor hockey.

Nevertheless, the average height of the athletes in this study remains slightly lower compared to elite international hockey players, who generally possess a taller stature. This difference may be influenced by various factors, including genetic characteristics, athlete development patterns, and varying levels of competition. In the context of indoor hockey, height is not the sole determinant of performance, as the game places a greater emphasis on agility, speed, and the ability to maneuver within relatively confined spaces.

Cardiorespiratory Endurance Capacity

The results revealed a mean VO_2max value of 46.91 ml/kg/min among the athletes, indicating a reasonably good cardiorespiratory endurance capacity. In hockey, aerobic capacity is vital because

ISSN xxxx-xxxx

matches are played in a high-intensity intermittent activity pattern involving a combination of sprinting, jogging, and walking.

Leslie (2012) explained that elite hockey players typically possess VO_2max values ranging from 50 to 60 ml/kg/min. Compared to these benchmarks, the athletes' aerobic capacity in this study remains slightly below the elite standard, suggesting that improvements in cardiorespiratory endurance are still necessary. A robust aerobic capacity enables players to maintain game intensity for longer durations and accelerates the recovery process during matches.

Research by Stankovic et al. (2023) demonstrated that high-intensity training interventions, such as high-intensity interval training (HIIT), are effective in enhancing aerobic capacity and physical performance in team sports. Therefore, implementing more specific and structured training methods could be a vital strategy for increasing the VO_2max of indoor hockey athletes.

Agility and Leg Muscle Power

Agility is a highly crucial fitness component in indoor hockey. The results demonstrated that the athletes achieved an average agility score of 28.27 repetitions in the side step test. This score reflects a reasonably rapid change-of-direction capability among the athletes.

Indoor hockey demands that players execute various movements, such as abrupt changes of direction, lateral shifts, and rapid transitions between attacking and defending phases. Consequently, agility is a critical factor in supporting on-field player performance. Bartolomei et al. (2019) stated that agility and leg power are key factors distinguishing hockey players' performance across different competition levels.

In addition to agility, leg muscle power plays an essential role in supporting athletic performance. The study's results revealed an average leg power value of 124.27 W/kg, indicating fairly good explosive leg muscle capability. This ability is highly necessary for activities such as short sprints, accelerations, and frequent directional changes during a hockey match. Research by Bandyopadhyay et al. (2019) also highlighted that explosive leg muscle strength correlates with acceleration and movement speed in hockey players.

Balance and Core Stability

The results indicated that the athletes' balancing ability averaged 25.09 seconds, with considerable variation observed among individuals. Balance is an essential component for maintaining postural stability while executing various technical movements in hockey.

In this sport, players frequently maneuver with a forward-leaning posture while controlling or dribbling the ball; thus, balance is a pivotal factor in preserving bodily stability. Naicker (2014) stated that neuromuscular stability and balance are associated with injury risk in hockey players. Athletes with superior balance capabilities tend to exhibit more stable movement control and face a reduced risk of injury.

Furthermore, an average core stability score of 11.73 levels suggests that the majority of the athletes possess relatively good core muscle endurance. The core muscles play a significant role in maintaining overall body stability and transferring force from the lower extremities to the upper extremities during sporting activities.

Reaction Speed and Muscular Strength

The findings showed a mean reaction speed of 0.38 seconds, which reflects a reasonably good response capability to visual stimuli. In the fast-paced game of indoor hockey, reaction ability is imperative for anticipating ball and opponent movements and for making rapid decisions.

From a sports performance science perspective, reaction capability is the result of integration among the visual system, central nervous system, and neuromuscular system. Roa (2024) explained that reaction speed in sports is influenced not only by physical abilities but also by perception processes, decision-making, and motor coordination.

Additionally, the study results revealed an average hand muscle strength of 41.91 kg among the athletes. Grip strength plays a vital role in stick control, passing stability, and the power required for striking or shooting. Research by Sharma et al. (2012) indicated that grip strength is linked to hockey players' technical performance, particularly concerning stick control and movement stability during matches.

CONCLUSIONS AND RECOMMENDATIONS

Based on the study results, male indoor hockey athletes in Banten Province possess a normal anthropometric profile with an average body mass index (BMI) of 22.12 kg/m², indicating a relatively proportional body composition to support high-intensity sports activities. Regarding physical fitness, the athletes demonstrated good conditioning in agility, muscular strength, leg power, and core stability—all of which are essential components for bolstering indoor hockey performance. However, cardiorespiratory endurance capacity and balance still exhibited variation among athletes, warranting specific attention in training programs. Overall, this study provides an overview of the anthropometric profiles and physical fitness conditions of indoor hockey athletes in Banten Province, which can serve as a foundation for performance evaluation and the development of more targeted training programs. Based on the findings, it is recommended that sports coaches and developers design more structured and specific training regimens, particularly focusing on enhancing athletes' cardiorespiratory endurance and balance to support optimal performance. Furthermore, sports federation officials can utilize these research findings as a reference for athlete development and regular physical condition monitoring. Future research is advised to involve a larger sample size and employ more comprehensive research designs to obtain a broader perspective on the anthropometric and physical fitness profiles of indoor hockey athletes in Indonesia.

ACKNOWLEDGEMENTS

The authors express their gratitude to all parties who provided support and assistance during the implementation of this research, especially to the management, coaches, and indoor hockey athletes of Banten Province who willingly participated in data collection. Appreciation is also extended to colleagues and all individuals who contributed to the smooth execution and successful completion of this study.

REFERENCES

Cejudo, A., Moreno-Alcaraz, V. J., & Sainz de Baranda, P. (2024). Risk Factors for Low Back Pain in Youth Inline Hockey Players During the Season—A Prospective Cohort Research. *Children*, *11*(12). https://doi.org/10.3390/children11121517

Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications, Inc.

Faylia, R. P., & . N. (2025). Validity Reliability and Standard Norm of Multistage Fitness Test for Measuring the Cardiorespiratory Endurance of the Junior High School Students Located in Kudus Regency. *International Journal Of Multidisciplinary Research And Analysis*, *08*(04). https://doi.org/10.47191/ijmra/v8-i04-59

Field, A. (2023). *Discovering Statistics Using IBM SPSS Statistics* (6th ed.). SAGE Publications.

Gürkan, A. C., Eraslan, M., Aydın, S., Altuğ, T., Türkmen, M., Söyler, M., Mülhim, M. A., Şahin, M., Karataş, B., Akcan, İ. O., & Küçük, H. (2025). Muscular strength and endurance adaptations to functional resistance training in young elite field hockey players. *Frontiers in Physiology*, *16*. https://doi.org/10.3389/fphys.2025.1536885

Hiepen, L., Bosserhoff, N., Schaudig, F., Heitzer, F., Jäger, M., & Mayer, C. (2025). Functional Knee Stability in Elite Field Hockey Depends on Playing Class and Gender. *Sports Medicine International Open*, *09*(CP). https://doi.org/10.1055/a-2417-2488

Jiménez-Casquet, M. J., Conde-Pipo, J., Valenzuela-Barranco, I., Rienda-Contreras, R., Olea-Serrano, F., Monserrat-Mesquida, M., Tur, J. A., Bouzas, C., & Mariscal-Arcas, M. (2024). Cross-Sectional Study of the Anthropometric Profile and Nutrient Status of Elite Female Ice Hockey Players: Differences by Play Position. *Nutrients*, *16*(4). https://doi.org/10.3390/nu16040471

ACSM. (2022). *ACSM's Guidelines for Exercise Testing and Prescription* (G. Liguori, Y. Feito, C. J. Fountaine, & B. Roy, Eds.; 11th ed.). Wolters Kluwer.

Puchalt-Urbano, X., Calderón-García, A., R. Huertas, J., Sánchez-Oliver, A. J., López de la Torre, C., Aguila-Aguilar, E., Lopez Soto, P. J., Luque, R. M., & Mata-Ordóñez, F. (2025). Knowledge Gaps, Sleep Disturbances, and Energy Imbalance Among Female Field Hockey Players. *Nutrients* , *17*(24). https://doi.org/10.3390/nu17243934

Putra, H. H. A., & Hariadi, I. (2025). Analysis of the Physical Condition of Male Outdoor Hockey Athletes in East Java. *Jurnal Pendidikan Kepelatihan Olahraga*, *17*, 219–228. https://doi.org/10.26858/cjpko.v17i1.71021

Rice, M. S., Warburton, D. E. R., Gaytan-Gonzalez, A., Jamnik, V. K., Kaufman, K., Warburton, D. R. D., Souster, M., & Bredin, S. S. D. (2024). The relationship between off-ice testing and on-ice performance in male youth Ice hockey players. *Frontiers in Sports and Active Living*, *6*. https://doi.org/10.3389/fspor.2024.1418713

Rosanas-Orra, R., Altarriba-Bartes, A., Vicens-Bordas, J., Merino-Tantiña, J., & Borràs-Boix, X. (2026). Relationship between physical parameters and shooting velocity in elite female rink

hockey players. *Apunts Sports Medicine*, *61*(229). https://doi.org/10.1016/j.apunsm.2025.100496

Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2023). *Research Methods in Physical Activity* (8th ed). Human Kinetics.

Turan, M., Ulupınar, S., Özbay, S., Gençoğlu, C., Savaş, B. Ç., & İnce, İ. (2022). *Validity and reliability of "My Jump app" to assess vertical jump performance: A meta-analytic review*. https://doi.org/10.21203/rs.3.rs-2154724/v1

Wörner, T., & Eek, F. (2025). Incidence, Prevalence, and Burden of Health Problems in Elite Female Ice Hockey Players—A One-Season Prospective Study. *Translational Sports Medicine*, *2025*(1). https://doi.org/10.1155/tsm2/5092272