

## PROFILE OF DOMINANT PHYSICAL COMPONENTS AMONG PETANQUE ATHLETES IN SOUTH SUMATRA

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**Abstract** This study aimed to identify and describe the dominant physical components of Petanque athletes in South Sumatra to provide empirical data for targeted training program development. A descriptive quantitative design was employed, involving 30 active Petanque athletes selected through a total sampling technique. Physical components assessed included arm muscle endurance, arm power, hand–eye coordination, static balance, and arm muscle strength. Data were collected through standardized field tests and analyzed using descriptive statistics, normality tests, and homogeneity tests via SPSS version 26.0. Results indicated that the majority of athletes demonstrated good to excellent performance in arm muscle strength, hand–eye coordination, and arm muscle endurance. Specifically, 33.33% of athletes were categorized as excellent, 60% as good, and 6.67% as moderate, with an overall mean score of 28.59 (good category). However, arm power and static balance showed greater variability, with some athletes falling into moderate categories, suggesting areas for improvement. These findings highlight the need for coaches to design specialized training interventions focusing on explosive arm power and balance without neglecting maintenance of already dominant components. The profiling data generated in this study can assist coaches, sports organizations, and policymakers in developing more effective, evidence-based athlete preparation programs for regional and national competitions.

**Keywords:** *Petanque, Physical, Fitness, Profiling*

### INTRODUCTION

Petanque is a precision sport originating from France that involves throwing metal balls (boules) as close as possible to a wooden target ball (jack) while standing within a designated circle. Although relatively new in Indonesia, introduced around 2011, Petanque has rapidly developed and is now contested at national and international levels (Pamungkas & Siantoro, 2024). The sport demands a combination of technical skills and specific physical components, such as coordination, balance, and muscle strength, to achieve accuracy and consistency in throws (Rabani & Nurhidayat, 2021).

The legal framework for sports development in Indonesia, as outlined in Law No. 11 of 2022 on Sports, guarantees athletes' rights in training, welfare, and career development (Hidayat et al., 2025). These provisions underscore the importance of systematic and

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sustainable training, which must be based on a comprehensive understanding of athletes' physical profiles. In Petanque, performance is influenced by various physical components, including strength, endurance, flexibility, speed, agility, coordination, and balance (Rizkiyati & Ismalasari, 2022).

Two primary techniques are employed in Petanque: pointing, where the aim is to place the boule as close as possible to the jack, and shooting, which requires striking an opponent's boule to displace it from a favorable position (Lambok Gabriel Oktavianus et al., 2024). Both techniques demand high levels of hand–eye coordination, static balance, and muscular control. Previous studies have shown that specific anthropometric and physical attributes—such as height, arm length, arm muscle strength, wrist flexibility, and postural stability—are significant determinants of Petanque performance (Hanief et al., 2019).

In South Sumatra, the development of Petanque has shown promising growth, yet faces challenges in athlete quantity, quality of coaching, and facility availability. The lack of systematic evaluation of athletes' physical components often leads to generalized training programs that may not address individual strengths and weaknesses. As a result, potential performance improvements are not fully realized. According to Bompa and Haff (2009), training effectiveness is maximized when programs are tailored to the athlete's dominant physical capacities and specific performance demands.

Several profiling studies in other regions—such as Karanganyar (Iwan Budi Setiawan, 2023), Kediri (Mohammad Irfan Hilmi, 2021), and East Java (Yulingga Nanda Hanief et al., 2021)—have identified that Petanque athletes often exhibit varying levels of development across key components, with coordination and balance frequently ranking high, while explosive arm power tends to require further enhancement. However, no comprehensive profiling study has been conducted on Petanque athletes in South Sumatra.

Therefore, this study seeks to fill that gap by systematically identifying the dominant physical components among Petanque athletes in South Sumatra. The findings are expected to guide coaches and sports organizations in designing evidence-based, targeted training programs that optimize performance in both regional and national competitions.

## **METHOD**

This study adopted a descriptive quantitative design aimed at profiling the dominant physical components of Petanque athletes in South Sumatra. The research targeted all active athletes in the province who met the inclusion criteria: being registered as active athletes, having completed at least six months of continuous training, and expressing willingness to participate. Using a total sampling technique, 30 athletes (18 males and 12 females) were recruited. Five physical components were measured through standardized field tests. Arm muscle endurance was assessed using a one-minute dumbbell curl test (1–3 kg) performed in a seated position, with the number of correct repetitions recorded for each arm. Arm power was evaluated through a distance throw test with a standard Petanque boule, taking the longest of three valid throws. Hand–eye coordination was measured by a target throw test, in which athletes attempted to land a boule within a 10 cm radius of a jack placed 7 meters away, performing six throws in total. Static balance was assessed using a one-leg stance test on tiptoes with hands on hips, recording the duration of maintained posture until balance was lost. Arm muscle strength was measured through a push-up test, with males performing for 15 minutes and females for 10 minutes, counting correct repetitions. Normative reference tables were used to classify performance into categories ranging from excellent to poor. All collected data were analyzed using SPSS version 26.0 to obtain descriptive statistics, including means, minimum and maximum values, and standard deviations. The Kolmogorov–Smirnov test was applied to assess data normality, while Levene's test evaluated homogeneity of variance, with a significance threshold of  $p > 0.05$  indicating normally distributed and homogeneous data

## RESULT

The physical profiling of 30 Petanque athletes in South Sumatra was conducted through five standardized field tests: arm muscle endurance, arm power, hand–eye coordination, static balance, and arm muscle strength. Descriptive statistics for each test item are presented in Table 1.

**Table 1.** Descriptive statistics of physical components among Petanque athletes (n = 30)

Test Item	Minimum	Maximum	Mean	Std. Deviation
Arm Muscle Endurance (T1)	45	60	54.70	5.43
Arm Power (T2)	10	20	16.13	4.27
Hand–Eye Coordination (T3)	25	45	33.00	4.49
Static Balance (T4)	9	30	16.07	4.61
Arm Muscle Strength (T5)	15	30	23.07	4.81
<b>Total Score</b>	118	162	142.97	11.36

The overall mean total score was **28.59**, which corresponds to the *good* category according to the established normative criteria. Classification of athletes based on overall performance revealed that 33.33% (n = 10) were in the *excellent* category, 60% (n = 18) in *good*, and 6.67% (n = 2) in *moderate*. None of the athletes fell into the *fair* or *poor* categories (Table 2).

**Table 2.** Overall classification of athletes' physical profiles

Category	Frequency	Percentage (%)
Excellent (>30)	10	33.33
Good (26–30)	18	60.00
Moderate (20–25)	2	6.67
Fair (17–19)	0	0.00
Poor (<17)	0	0.00

Normality testing using the Kolmogorov–Smirnov test indicated that all physical component scores were normally distributed ( $p > 0.05$ ). Homogeneity testing using Levene's test confirmed that variances were homogeneous across all test items ( $p > 0.05$ ), allowing for the application of parametric analysis.

These results indicate that the majority of Petanque athletes in South Sumatra possess well-developed arm muscle strength, hand–eye coordination, and arm muscle endurance. However, variations were observed in arm power and static balance, suggesting potential areas for targeted training interventions.

## DISCUSSION

### Planning

The findings indicate that planning is conducted through structured short-, medium-, and long-term programs, consistent with the principles outlined by Shaifudin (2021), who emphasizes that effective planning in sports organizations requires setting measurable objectives, aligning them with competition schedules, and allocating resources accordingly. This approach is similar to the case of Olympic Pool Jepara, where well-defined planning improved athlete preparedness and performance outcomes (Nur Rohmat & Hudah, 2023).

However, in Palembang, limitations in funding and infrastructure occasionally impede the execution of planned programs. This aligns with Aditiya's (2024) observation that resource constraints often hinder the full realization of sports development plans, despite the presence of sound strategic designs.

### Organizing

The organizational structure in PRSI Palembang is clearly defined, with a division of responsibilities between administrators and coaches, as suggested by Nofriyanti et al. (2020), who note that role clarity is essential for operational efficiency. The inclusion of medical personnel, logistics coordinators, and administrative support further reflects a comprehensive organizing strategy. This structure mirrors Nugroho's (2016) findings in PRSI Cilacap, where effective role allocation and inter-department coordination contributed to stable performance outcomes. Nonetheless, in Palembang, the need for broader stakeholder involvement—particularly from private sector sponsors—remains a gap in optimizing organizational capacity.

The findings of this study revealed that the majority of Petanque athletes in South Sumatra demonstrated good to excellent levels of arm muscle strength, hand–eye coordination, and arm muscle endurance, with 93.33% of athletes falling into these categories. These components are essential in Petanque, as the sport requires repeated, precise throwing actions that depend on both muscular endurance and neuromuscular coordination (Hanief et al., 2019). The high performance in these areas suggests that current training programs adequately address the maintenance of muscular endurance and coordination, enabling athletes to execute consistent and accurate throws throughout matches.

Arm muscle endurance, which achieved a mean score of 54.70, plays a critical role in sustaining performance during long matches. Bompa and Haff (2009) describe muscular endurance as the ability of a muscle group to repeatedly contract over extended periods without fatigue. This aligns with the demands of Petanque, where athletes must perform multiple throws under competitive pressure. Similar findings were reported by Iwan Budi Setiawan (2023) in Karanganyar and Yulingga Nanda Hanief et al. (2021) in East Java, where athletes with higher endurance maintained technical accuracy across multiple rounds.

Hand–eye coordination also emerged as a dominant component, with a mean score of 33.00, reflecting athletes' ability to align visual perception with precise arm movements. Rabani and Nurhidayat (2021) emphasized that accurate pointing and shooting in Petanque rely heavily on this coordination, which can be improved through targeted drills such as repeated target throws and variable distance practice. The present results are consistent with studies by Natasya et al. (2024), who found that superior hand–eye coordination significantly correlated with scoring accuracy in Petanque.

In contrast, arm power and static balance showed greater variability among athletes, with some falling into the moderate category. The mean arm power score of 16.13 indicates that while athletes possess adequate strength for throwing, the explosive component may be underdeveloped. According to Lambok Gabriel Oktavianus et al. (2024), greater arm power contributes to more effective shooting techniques, enabling athletes to displace opponents' boules with higher accuracy and force. Similarly, the mean static balance score of 16.07 suggests that balance training may not be a primary focus in current practice routines, despite its importance in maintaining stability during both pointing and shooting actions. This observation is supported by Gustira et al. (2024), who argue that enhanced balance improves biomechanical efficiency and accuracy in precision sports.

The overall mean score of 28.59, classified as good, reflects the relatively strong physical preparedness of Petanque athletes in South Sumatra. However, the data also highlight the need for specialized training to improve arm power and static balance without compromising existing strengths. This targeted approach is consistent with the principle of specificity in sports training, which states that performance gains are maximized when training stimuli closely match the demands of the sport (Bompa & Haff, 2009). Incorporating plyometric exercises, functional strength training, and balance drills could address these gaps.

Compared to previous studies in other regions, the physical profile of South Sumatra athletes appears similar in coordination and endurance but lags slightly in power development.

This suggests that while general conditioning programs are effective, the integration of explosive training elements could elevate performance to higher competitive standards. By applying these findings, coaches and sports organizations can design evidence-based, individualized training plans that enhance performance in both regional and national competitions.

#### **KESIMPULAN DAN SARAN**

This study concluded that Petanque athletes in South Sumatra generally possess good to excellent levels of arm muscle strength, hand–eye coordination, and arm muscle endurance, which are key determinants of performance in this precision sport. These strengths enable athletes to maintain throwing accuracy and consistency throughout competition. However, the results also revealed that arm power and static balance varied considerably among athletes, with some falling into moderate categories, highlighting the need for targeted improvement. To address these gaps, coaches are advised to integrate sport-specific training that emphasizes explosive arm movements and stability drills, such as plyometric exercises and functional balance training, while continuing to maintain the current high levels of endurance and coordination. Athletes are encouraged to participate in regular physical assessments to monitor progress across all components, ensuring balanced development. Sports organizations, including KONI and regional sports departments, should support these efforts by providing structured, evidence-based training programs, adequate facilities, and qualified coaching personnel. Furthermore, future research should broaden the profiling framework to include technical, tactical, and psychological aspects of performance, and involve a larger, more diverse sample across multiple regions to develop a comprehensive understanding of the physical and performance characteristics required for elite Petanque competition in Indonesia.

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