

Basic Technical Analysis of Footwork Motor Skills in Badminton Players Aged 10–12

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Abstract

This study examines deficiencies in basic badminton footwork among 20 junior athletes aged 10–12 at PB Abimanyu Purworejo to identify needs for targeted training interventions. The research objective was to describe the level of footwork motor skills and provide evidence-based recommendations for improving agility and coordination. Participants were 20 club members (8 male, 12 female) selected by total sampling and tested on a standardized 30-second footwork/agility protocol administered on June 6, 2026. A quantitative descriptive (survey) design was used, with data collected via a test-and-measurement instrument scored by trained assessors and analyzed using percentages and descriptive statistics (mean, min, max, SD) in SPSS 26. Results show a mean footwork score of 13.15 (SD = 3.977; range 7–21), with categorical distribution: Excellent 5%, Good 35%, Moderate 15%, Poor 20%, and Very Poor 25%; overall, 60% of athletes fell into suboptimal categories (Moderate–Very Poor). The study concludes that many athletes exhibit limited agility, dynamic balance, and neuromuscular coordination, indicating an urgent need for systematic footwork, balance, and multimodal agility training. Future research should use longitudinal or quasi-experimental designs to evaluate the effectiveness of the proposed interventions and examine training frequency, coaching history, and psychometric validation of the test instrument.

Keywords: Badminton; Footwork; Motor Skills; Agility; Young Athletes

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1. INTRODUCTION

Badminton is a racket sport played by two people (in singles) and two pairs (in doubles) who take positions on opposite sides of a court divided into two halves by a net (Zhannisa et al., 2018). Badminton, as a dynamic sport, requires comprehensive mastery of basic techniques, in which footwork plays a crucial role in efficient movement on the court. Unstable footwork not

only affects technical accuracy and increases the risk of injury, but also hinders an athlete's agility (Musawwir et al., 2023). The importance of mastering basic footwork techniques cannot be overlooked, as they form the foundation for a badminton player's optimal performance (Muaflah & Indarto, 2023). This is in line with Muthiarani's view that footwork is a fundamental technique that must be mastered in order to track the shuttlecock's trajectory quickly and accurately (Azhar et al., 2022).

Good footwork allows players to position their bodies optimally for effective shots and enables quick, accurate changes in direction without losing their balance (Aryanti et al., 2021; Septyani et al., 2024). Nevertheless, early childhood development programs are often not utilized to their full potential due to ineffective or inefficient training models (Muthiarani & Lismadiana, 2021). Therefore, early identification of potential talent, including motor skills and agility, is an essential step in the development of young badminton athletes (Anugrah et al., 2023; Gunawan et al., 2023).

Excellent physical fitness in athletes, including strength, agility, and endurance, is an essential prerequisite for achieving high-level performance in badminton, and footwork drills can significantly improve agility (Rifai et al., 2020). Further studies show that agility is a crucial component of badminton players' footwork and is even positively correlated with lower-body muscle power (Romdona et al., 2025).

The importance of footwork drills and shadow training has also been proven to significantly influence the agility of badminton players, particularly among athletes aged 10–12 who are in the ideal stage of muscle development for improving strength and coordination (Muthiarani & Lismadiana, 2021; Putra & Lubis, 2024). However, reality often reveals a gap between this ideal scenario and actual practice, where a lack of structured physical activity in early childhood can lead to delays in gross motor development. Without a proper assessment of a child's motor skills, it is impossible to provide effective solutions or interventions (Atradinan et al., 2020). Therefore, this study focuses on an in-depth analysis of basic footwork techniques among 10- to 12-year-old badminton players at the PB Abimanyu Purworejo Club, given that continuous movement training from an early age is crucial for achieving the highest quality of movement (Atradinan et al., 2020).

Observations show that athletes often have difficulty chasing the shuttlecock because their footwork is sluggish, and they are unable to change direction quickly and maintain their balance (Septyani et al., 2024). This problem is compounded by the finding that many novice athletes aged 10–12 still exhibit low levels of agility, largely due to a lack of competitive experience and specialized training focused on improving agility (Nopiyanto et al., 2021). In addition, difficulty coordinating foot movements effectively and an inability to maintain body stability while performing footwork are often obstacles that lead to poor ball placement and reduced effectiveness on the court (Musawwir et al., 2023).

2. METHOD

This study employs a quantitative descriptive approach using a survey method. Descriptive research aims to describe the situations or characteristics of a subject. This is consistent with Ramdhan, (2021) "Descriptive research is research that does not aim to test a specific hypothesis, but merely describes a particular variable, phenomenon, or situation as it

is.” Therefore, this study merely identifies and describes a phenomenon. The purpose of this study is to examine the level of footwork ability among badminton athletes at the PB Abimanyu Purworejo club.

2.1 Participants

The population in this study consisted of 20 badminton athletes from PB Abimanyu Purworejo, comprising 8 male and 12 female athletes. Total sampling was used as the sampling method, which is a method in which the sample size is equal to the population. Since the study population was Poor than 100, the total sample size was 20 participants. The study was conducted on June 6, 2026, at the Bina Persahabatan Multipurpose Building in Purworejo.

2.2 Research Design

This study employs a quantitative descriptive approach using a survey method. Descriptive research aims to depict or describe a phenomenon or condition as it occurs in the research subject, without intervening in the subjects. In this case, the study is intended to identify and describe the level of basic footwork motor skills among 10- to 12-year-old badminton players at the PB Abimanyu Purworejo Club; the data is then analyzed quantitatively using test results.

2.3 Instruments

The data collection method used was the test-and-measurement method, which involved administering a badminton footwork skills test to the research subjects.

2.4 Procedures

a. Purpose

This test is conducted to measure badminton players' agility in performing footwork during a badminton match. The standards for this test apply to badminton players aged 10–12 years.

b. Tools and Equipment

- Badminton Court
- Writing materials and assessment forms

c. Technical Implementer

- Grader
- Test Supervisor

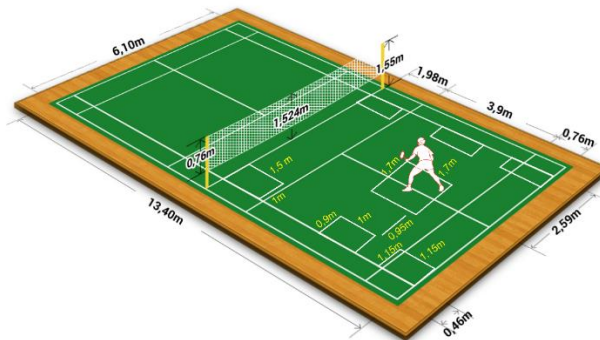
d. Implementation Guidelines

- The testee stands in the center of the designated field.
- The referee stands next to the court or on the opposite side of the court, separated by the net.
- The testee steps forward with their right foot until one foot enters the white box in the right corner, then returns to the center of the court. Repeat this step by stepping forward with the left foot to the designated white mark as well, then to the boxes on the right and left, followed by an overhead swing until the foot also touches the designated white marks at the rear right and rear left corners.

- Perform the movement for 30 seconds, repeating the same steps in sequence.

Figure 1.

Conducting the Agility Test



source: (Wiyanto et al., 2020)

e. Assessment

The score is calculated based on the number of footholds obtained when the foot enters the target located at the corner of the field.

f. Footwork Test Standards

Table 1.

Footwork Test Standards

Category	Value	
	Male	Female
Excellent	≥19	≥19
Good	16-18	16-18
Moderate	13-15	13-15
Poor	10-12	10-12
Very Poor	≤9	≤9

2.5 Data Analysis

To analyze data on the physical condition of badminton athletes from PB Abimanyu Purworejo, the “percentage” test technique was used, aided by the SPSS 26 software, namely:

$$P = \frac{f}{n} \times 100\%$$

Description:

P : Percentage

f : Frequency

n : Sample Size

3. RESULTS

The results of the data analysis, which used descriptive analysis, are presented as the mean, standard deviation, minimum, and maximum values using SPSS version 26.

Table 2.

Description of Footwork Test Results

Sample	Gender	Age	Result	Category
X1	M	10	14	Moderate
X2	M	10	14	Moderate
X3	M	12	17	Good
X4	M	12	21	Excellent
X5	M	12	17	Good
X6	M	12	12	Poor
X7	M	10	13	Moderate
X8	M	11	12	Poor
X9	F	10	16	Good
X10	F	10	16	Good
X11	F	10	7	Very Poor
X12	F	12	8	Very Poor
X13	F	11	16	Good
X14	F	12	17	Good
X15	F	10	9	Very Poor
X16	F	12	17	Good
X17	F	10	10	Poor
X18	F	10	11	Poor
X19	F	10	9	Very Poor
X20	F	10	7	Very Poor

Table 3.

Description of the Statistical Results of the Footwork Test

Description	N	Min	Max	Mean	SD
Footwork Test Results	20	7	21	13.15	3.977

Table 3 shows the following statistical calculations: sample size (N) of 10 athletes, minimum score of 7, maximum score of 21, mean of 13.15, and standard deviation of 3.977.

Figure 2.

Footwork Test Results Chart

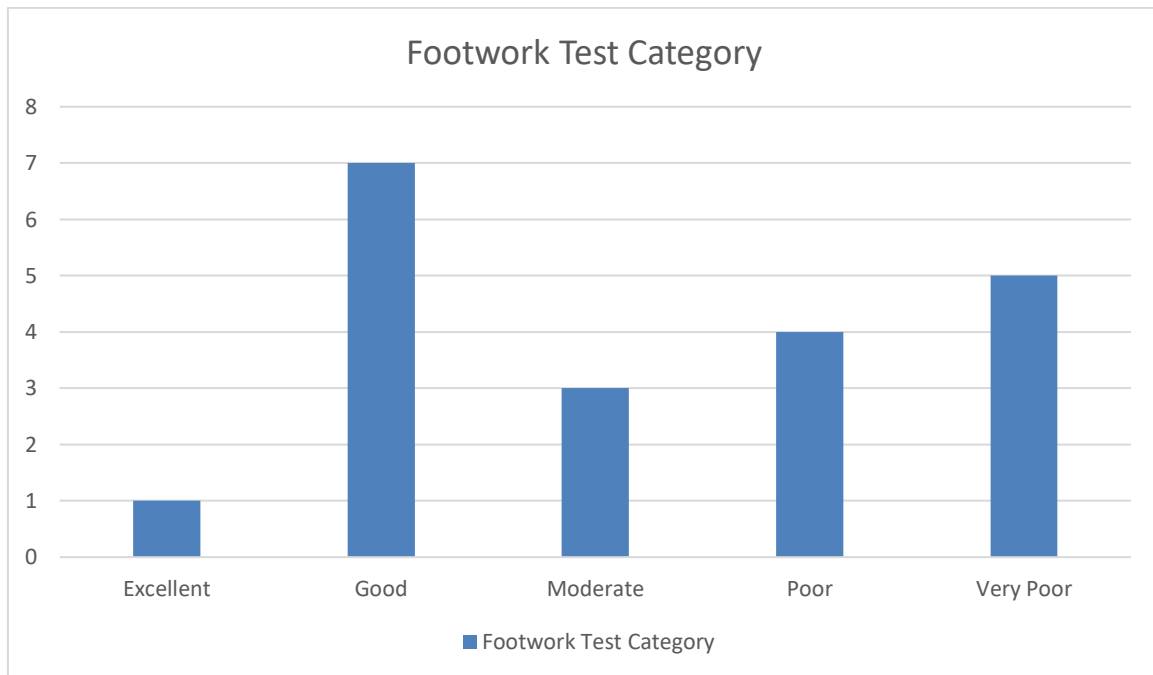


Figure 2 shows that players' footwork skills are categorized as "Excellent" (1), "Good" (7), "Moderate" (3), "Poor" (4), and "Very Poor" (5).

4. DISCUSSIONS

This study used a quantitative descriptive design to describe the level of footwork motor skills among 20 badminton athletes aged 10–12 years at the PB Abimanyu Purworejo Club, consisting of 8 male athletes and 12 female athletes. The results of the descriptive analysis show a mean score of 13.15 with a standard deviation of 3.977, a minimum score of 7, and a maximum score of 21. The distribution of these scores reflects a fairly wide variation in ability among the athletes, indicating gaps in motor development that require serious attention from coaches.

Overall, the categorical distribution of the footwork test results shows that 1 athlete (5%) was in the "Excellent" category, 7 athletes (35%) in "Good," 3 athletes (15%) in "Moderate," 4 athletes (20%) in "Poor," and 5 athletes (25%) in the "Very Poor" category. These findings indicate that more than half of the athletes (60%) are still at a suboptimal level namely, in the Average, Poor, and Very Poor categories and therefore still require a more systematic and structured footwork training program.

The average score of 13.15 places the group of athletes as a whole on the threshold of the "Moderate" category based on the footwork test norms used (score range of 13–15 for the "Moderate" category). The standard deviation of 3.977 indicates a relatively high level of

dispersion around the mean, suggesting a lack of homogeneity in footwork ability among the athletes in the club. Such differences are commonly found in the 10–12-year-old age group, given that individuals in this age range are at various stages of gross motor skill development.

These findings are consistent with the results of a similar descriptive study of the same age group, in which, among the 20 members of the Yanti Jaya Badminton Club, the dominant category was “moderate” at 70 percent, while the “good” category accounted for only 20 percent and the “poor” category for 10 percent (Irfan & Hasanuddin, 2023). This confirms that at the beginner club level, the majority of athletes aged 10–12 have not yet developed optimal footwork skills.

The table of individual test results shows striking differences between male and female athletes. In the male group (n=8), average scores were generally higher, with one athlete achieving the highest overall score (21, Excellent) and most falling into the Good and Fair categories. In contrast, in the female group (n=12), there was a greater concentration in the lower categories; 5 female athletes (41.7% of the female group) fell into the “Poor” or “Very Poor” categories.

These differences can be attributed to differences in physiological development and training experience. In a study by Erol (2022) published in the journal **Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi**, a 12-week badminton footwork training program produced different improvements in strength and agility between male and female groups aged 8–12 years. Age also played a significant role: 12-year-old athletes in this study tended to have higher scores than 10-year-old athletes, indicating that neuromuscular maturation contributes to improved footwork ability with age.

Footwork in badminton is not merely the ability to run after the shuttlecock, but rather a complex neuromuscular skill that involves simultaneous acceleration, deceleration, changes in direction, and maintaining balance. Malwanage et al., (2022) An intervention study published in PLoS ONE confirms that footwork performance is characterized by the ability to accelerate, decelerate, and change direction on the court to execute accurate shots, and involves moving to and from six zones on the court using step strategies, lunge strategies, and coordinated arm movements.

The study also demonstrated that 8 weeks of balance training significantly improved the footwork performance of badminton athletes aged 13–15, including push-off time for front forehands, side forehands, and back overhead shots. The implications of these findings for the study at PB Abimanyu are that low footwork scores are not caused solely by a lack of foot speed, but also reflect deficits in dynamic balance and neuromuscular coordination, which require specific training interventions.

Arando et al., (2024) An article in the International Journal of Human Movement and Sports Sciences reinforces the argument that agility training is one of the primary methods for improving badminton footwork skills, enabling athletes to move quickly and precisely on the court without losing their balance. The low agility scores among PB Abimanyu athletes, as reflected by the high percentage of athletes rated in the “Poor” and “Very Poor” categories, indicate the need for a more intensive and structured agility training program.

The poor footwork skills among most athletes at PB Abimanyu Purworejo can be explained by several interrelated factors:

a. Limited Competition Experience and Specific Training

Many beginner athletes aged 10–12 still exhibit low agility, largely due to a lack of competitive experience and a lack of specialized training focused on improving agility. This finding is consistent with observations of athletes from PB Abimanyu, who have difficulty changing direction quickly and maintaining balance, and whose footwork appears heavy when chasing the shuttlecock.

b. Suboptimal Motor Development

The ages of 10–12 years mark a transitional period in gross motor development. Without adequate structured physical stimulation, children in this age range may experience delays in the development of essential motor skills. Wang & Zhou, (2024) A meta-analysis published in **Frontiers in Public Health** confirms that exercises focused on motor development are significantly more effective at improving gross motor skills than regular physical activity, with effects evident even in young children. These findings reinforce the argument that structured exercise programs are essential for the age group studied.

c. Ineffective Training Models

Muthiarani & Yuniana (2021), in the *Journal of Sports Science*, emphasize that early-age development is often not optimized due to training models that are not effective or efficient enough. The study demonstrates that shadow drills using sequential and crisscross step methods significantly improve footwork agility, indicating that variations in training methods have a significant impact on the development of footwork skills.

d. Motor Coordination and Balance Deficits

Difficulty coordinating leg movements effectively and an inability to maintain body stability while performing footwork result in poor ball placement and decreased playing effectiveness. Gusliandi et al. (2020) demonstrate that specialized footwork training has a significant positive effect on improving the agility of badminton athletes, suggesting that targeted interventions can address the coordination deficits identified in this study.

Compared to similar descriptive studies, the results of PB Abimanyu's research show a lower profile. Kurniawan et al., (2024) A study published in *Kinestetik: A Scientific Journal of Physical Education** found that a combination of hurdle drills and shadow exercises effectively improves badminton footwork skills, reinforcing the evidence that multi-method training interventions are more effective than conventional single-method training.

At the international level, studies Malwanage et al., (2022) This indicates that even competitive athletes aged 13–15 who already have competition experience still require specific balance training to significantly improve their footwork performance. This reinforces the finding that, for the 10–12-year-old group at PB Abimanyu—a younger age group with more limited experience—a comprehensive footwork training program is of the utmost urgency.

Study Arnando et al., (2024) A study published in the *International Journal of Human Movement and Sports Sciences* found that structured agility training significantly improves badminton players' footwork; athletes who underwent a structured agility training program demonstrated better movement coordination, faster reaction times, and greater efficiency in on-court movements. This reference serves as an important guide in designing a performance improvement program for PB Abimanyu athletes.

Based on the results of data analysis and a comprehensive literature review, the following

are evidence-based training program recommendations to improve the footwork skills of PB Abimanyu Purworejo athletes:

1. **Shadow Drills with Step Variations:** Referring to Muthiarani & Yuniana (2021), Shadow training that combines sequential and crisscross steps should be systematically incorporated into regular training sessions, at least three times a week. This method has been proven to significantly improve footwork agility.
2. **Dynamic Balance Training:** Adapting a balance training protocol proven by Malwanage et al., (2022) for 8 weeks, with a focus on exercises that train dynamic one-legged balance and multi-directional movements, since balance is a key foundation of footwork performance.
3. **Multimodal Agility Training:** A combination of ladder drills, shuttle runs, and light plyometrics, as recommended by Arnando et al., (2024) and Gusliandi et al. (2020) to develop agility, reaction speed, and neuromuscular coordination simultaneously.
4. **Game-Based Approach:** Based on the results of a study by Y. Wang et al. (2025) in Science Reports, a badminton curriculum modified to include situational game elements was shown to effectively improve the physical fitness and footwork performance of elementary school students, making it a suitable approach for the 10–12 age group.
5. **Periodic Evaluation and Individual Monitoring:** Given the high standard deviation (3.977), which indicates variation in ability among athletes, periodic evaluations (every 4–6 weeks) using the same footwork test are necessary to monitor individual progress and adjust the training load progressively.

This study has several limitations that must be acknowledged. First, the relatively small sample size ($n=20$) limits the generalizability of the results to a broader population. Second, the cross-sectional design captures conditions at a single point in time and cannot explain longitudinal changes in footwork ability. Third, the lack of a more in-depth analysis of factors—such as training frequency, coaching duration, and history of physical activity—limits our understanding of the identified determinants of footwork ability. Fourth, although the agility test used has specific norms for the 10–12-year-old age group, it has not undergone comprehensive psychometric validation as has been done Williyanto et al., (2023) in the development of a junior footwork test instrument published in the International Journal of Human Movement and Sports Sciences.

5. CONCLUSIONS

The results of a basic technical analysis of footwork motor skills among 20 badminton players aged 10–12 at the PB Abimanyu Purworejo Club show that the majority of athletes (60%) are still in the suboptimal categories (Moderate, Poor, and Very Poor), with an average score of 13.15 (Moderate category). These findings highlight the need for a more systematic, comprehensive, and scientifically based footwork training intervention program.

Recent literature reviews confirm that footwork ability is a fundamental component of badminton performance, influenced by factors such as dynamic balance, neuromuscular coordination, agility, and reaction speed. Interventions based on shadow training, balance training, agility drills, and game-based approaches have been scientifically proven to be effective in improving footwork ability in the relevant age groups. Further research is recommended using longitudinal or quasi-experimental designs to more conclusively measure the effectiveness of the

recommended training programs.

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