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SELECTION OF PHYSICAL AND TECHNICAL ASSESSMENT TESTS FOR MALE BADMINTON PLAYERS AT CAN THO UNIVERSITY, VIETNAM

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Abstract:
The performance of a badminton athlete relies heavily on his/her physical fitness and technical skills. This research aims to select appropriate tests for evaluating the physical fitness and technical proficiency of male badminton players representing the Can Tho University's team. The study employs standard research methodologies in sports science, including literature review, interviews, pedagogical assessment, and statistical analysis, to determine the reliability of the chosen tests. As a result, eight tests have been identified, comprising four assessing physical fitness and four assessing technical skills, including long jump (cm), 30-second abdominal crunch (times), 30-meter sprint (seconds), 1-minute rope jump (times), 20 lateral movements (seconds), back-and-forth blocking movements and shots in 1 minute (times), overhead shots in one minute (times), 40 jumps and shots (seconds).

Keywords: test, physical fitness, technical skills, badminton, Can Tho University

1. Introduction

In recent years, the country as a whole and Can Tho University in particular have given considerable consideration to developing the physical and technical abilities of male badminton team athletes. This mission demands innovation in training methods to enhance agility and aerobic and anaerobic capacities among the athletes.

In addition to athletes' technical abilities, their positioning in matches also merits attention during training because it plays a crucial role in executing strategies, such as moving forward and backwards on the court and adopting parallel defensive stances.

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Research by Vu Thi Nho on the physical development of university students indicates that while their major bodily systems are primarily mature, further growth and weight gain in certain parts are possible through proper nutrition and exercise routines. This means that muscle development is still possible for such youngsters and is believed to positively impact the training work.

Badminton is a highly competitive sport requiring players to have a high capacity for adapting to significant physical demands and sustaining coordination over extended periods. In modern badminton competitions, the players must possess more significant physical and technical skills as matches become more intense. Hence, enhancing athletes' physical attributes and refining their technical expertise are seen as urgent issues in sports training. Recognizing this importance, the researchers conducted a study on "Selection of Physical and Technical Assessment Tests for Male Badminton Players at Can Tho University".

This study aims to select tests to evaluate the physical fitness and technical skills of male badminton athletes at Can Tho University.

2. Methodology

2.1 Research methods

The study employed the following research methods:

- Literature review to synthesize information from 25 documents related to physical and technical aspects of badminton, providing a theoretical foundation for selecting research objectives and discussing the results
- Questionnaire-based interviews to gather opinions from 22 experts, professionals, lecturers, and managers with experience in badminton coaching in Ho Chi Minh City and Can Tho Province to shortlist the study subjects' physical and technical assessment tests.
- A pedagogical testing method to evaluate the physical and technical assessment tests of the male badminton players on the Can Tho University team.
- Statistical methods to process and analyze the data collected with SPSS software version 22.0.

2.2 Participants

- Testees: 15 male athletes of the badminton team at Can Tho University.
- Interviews: 22 experts, coaches, lecturers, and managers with experience in coaching and teaching badminton.

3. Results

The process of identifying assessment tests for the physical and technical levels of male badminton players at Can Tho University was carried out in three steps as follows:

- Step 1: Synthesizing physical and technical assessment tests recommended by national and international authors,
- Step 2: Conducting interviews with experts, coaches, lecturers, and managers who have specific knowledge about the physical and technical assessment tests in badminton,
- Step 3: Verify the reliability of the assessment tests.

3.1. The synthesis of assessment tests for the physical fitness and technical skills training for badminton athletes

The researchers conducted a synthesis of assessment tests that are used to evaluate the physical strength and technical abilities of badminton athletes from reliable domestic and foreign authors, including Le Banh My – Khach Hau Chinh (2000) [11], Cuong Nguyen Manh (2009) [4], Hai Pham Van (2014) [7], Do Vinh (2011) [25], Bo.Omosegoard (2005) [2], Gunalan D.P (2001) [5], Thuy Nguyen Hac (1997) [16], Thuy Nguyen Hac - Binh Nguyen Quy (2000) [17], Vinh Tran Van – Thanh Dao Chi (1998) [21], Vinh Tran Van and colleagues (2009) [22], Hung Le Tien (2008) [8], Son Le Hong (2005) [13], Huy Chau Vinh [9], Coaching team of Vietnam badminton team (2000 - 2003) [1], Tung Mai Thanh (2007) [18], Vien Pham Ngoc (1996) [20], Thanh Nguyen Xuan (2007) [14], etc.

The result indicates that almost all authors tend to utilize multiple tests to assess badminton athletes' physical fitness and technical level. Additionally, some tests still have not been standardized among the authors.

The selection of physical and technical assessment tests for male badminton players at Can Tho University was based on the following principles:

- Tests that were used by more than half of the authors.
- Tests that are suitable for the characteristics of badminton and align with the local context.

Based on these principles, the study selected the following tests:

- **Physical assessment tests**: High jump (cm), Long jump (cm), 30-meter frog jump (s), 30-second abdominal crunch (times), 30-meter sprint (seconds), 60-meter sprint (seconds), 1-minute rope jump (times).
- **Technical assessment tests**: 20 lateral movements (seconds), Back-and-forth blocking movements and shots in 1 minute (times), Overhead shots in one minute (times), Overhead forehand shots in one minute (times), 40 jumps and shots (seconds).

3.2. Interviews with experts, coaches, and managers to identify assessment tests for the physical fitness and technical abilities of male badminton players of the Can Tho University team

The interviews were conducted twice (first interview: 22 participants; second interview: 24 participants). Each of them was separated by one month. Both rounds utilized the same assessment method and test system with the same responses graded as follows:

- Very necessary: 5 points,

- Necessary: 4 points,
- Neutral: 3 points,
- Little necessary: 2 points,
- Unnecessary: 1 point

In total, there were 46 respondents across both interviews, comprising 25 experts/coaches (54%), 15 lecturers (33%), and 6 managers (13%).

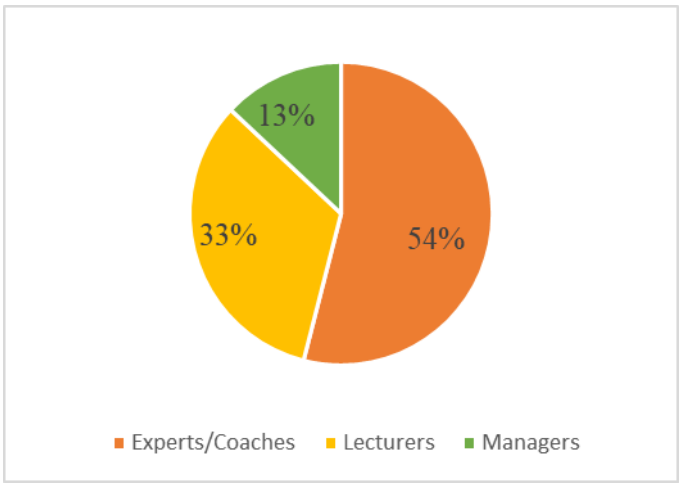

Figure 2.1: Interviewees

The index χ^2 (when squared) is used to test the consistency of results between the two interview sessions. The results are presented in Table 1.

Table 1: Comparison between the two interviews' results

Test		**1st (n = 24)**		**2nd (n = 22)**		χ^2	**P**
		∑point	%	∑point	%		
Physical strength	High jump (cm),	56	73	63	71	0.02	> 0.05
	Long jump (cm)	82	91	83	92	0.01	> 0.05
	30-meter frog jump (s)	62	73	65	67	0.20	> 0.05
	30-second abdominal crunch (times)	85	95	88	88	0.93	> 0.05
	30-meter sprint (seconds)	88	95	92	92	0.27	> 0.05
	60-meter sprint (seconds)	60	68	57	67	0.01	> 0.05
	1-minute rope jump (times)	93	95	93	92	0.27	> 0.05
Technical skills	20 lateral movements (seconds)	88	95	91	96	0.00	> 0.05
	Back-and-forth blocking movements	88	91	89	92	1.25	> 0.05
	Overhead shots in one minute (times)	95	95	95	88	0.93	> 0.05
	Overhead forehand shots in one minute (times)	62	68	60	67	0.01	> 0.05
	40 jumps and shots (seconds)	98	95	100	92	0.27	> 0.05

In Table 1, it is evident that the tests in both interview sessions exhibit $\chi^2_{\text{calculated}} < \chi^2_{\text{table}}$ (= 3.84) at a probability threshold of $P > 0.05$. In other words, the difference between the two mean values is not statistically significant at a probability threshold of $P > 0.05$. It could be inferred that experts, coaches, and lecturers are highly agreed upon regarding their responses across the two interview sessions.

Afterwards, which tests have a total score exceeding 75% of the total score in both interview sessions (round 1 = 95.7 points, round 2 = 97.6 points) would be selected as the official tests for evaluating the technical and physical levels of male badminton players of the Can Tho University team. The chosen tests are as follows:

- **Physical assessment tests**: Long jump (cm), 30-second abdominal crunch (times), 30-meter sprint (seconds), 1-minute rope jump (times).
- **Technical assessment tests**: 20 lateral movements (seconds), Back-and-forth blocking movements and shots in 1 minute (times), Overhead shots in one minute (times), 40 jumps and shots (seconds).

3.3. The reliability of tests

The researchers assessed some badminton athletes to determine the reliability of the chosen tests. The interval between the two assessment sessions was one month, and the testing conditions were the same. The obtained results were used to calculate the correlation coefficient (r) between the two assessment sessions, as presented in Table 2.

- If the correlation coefficient r is ≥ 0.80 with P ≤ 0.05, that test is sufficiently reliable.
- If the correlation coefficient r is < 0.80, that test is deemed unreliable.

Table 2: Reliability coefficients of the chosen assessment tests

Factor	Test	1st		2nd		r	P
		$\overline{X}$	S_x	$\overline{X}$	S_x		
Physical strength	Long jump (cm)	2.34	0.12	2.45	0.13	0.94	< 0.05
	30-second abdominal crunch (times)	21.8	1.37	23.27	1.39	0.89	< 0.05
	30-meter sprint (seconds)	4.50	0.24	4.4	0.23	0.86	< 0.05
	1-minute rope jump (times)	105.07	6.91	105.87	5.94	0.93	< 0.05
Technical abilities	20 lateral movements (seconds)	38.20	0.77	37.00	0.85	0.87	< 0.05
	Back-and-forth blocking movements and shots in 1 minute (times)	11.47	0.99	12.33	0.82	0.94	< 0.05
	Overhead shots in one minute (times)	22.40	1.68	23.33	1.18	0.90	< 0.05
	40 jumps and shots (seconds)	82.33	1.11	83.20	0.77	0.91	< 0.05

Table 2 illustrates the reliability coefficient between the two assessment sessions, ranging from 0.86 to 0.94 (with P < 0.05). This indicates the reliability of the eight selected tests for assessing the physical base and technical abilities of Can Tho University's male badminton athletes.

In conclusion, the research has identified eight strength assessment tests for male athletes from Can Tho University's badminton team, including:

- **Physical assessment tests**: Long jump (cm), 30-second abdominal crunch (times), 30-meter sprint (seconds), 1-minute rope jump (times).
- **Technical assessment tests**: 20 lateral movements (seconds), Back-and-forth blocking movements and shots in 1 minute (times), Overhead shots in one minute (times), 40 jumps and shots (seconds).

4. Discussion

4.1 Physical assessment tests

Badminton, an individual non-contact sport, requires significant strength, particularly in the lower body parts. Therefore, strength exercises (such as the long jump) are crucial for the training regimen of the male badminton team at Can Tho University. This underscores the suitability of selecting the long jump test to assess the athletes' lower body strength.

Endurance, which encompasses both muscular endurance and quick endurance, is also crucial for sustained performance during badminton matches. The 30-second abdominal crunch (times) exercise, as a result, has been chosen to evaluate the general endurance of the players, reflecting its importance in prolonged badminton play.

Another notable aspect is that badminton demands sustained activity from most muscles in the body. In other words, the players must maintain continuous movement speed to handle defensive and offensive situations, highlighting the importance of speed endurance. Therefore, 30-meter sprint and 1-minute jump rope tests are appropriate for assessing the stamina of both upper and lower body parts.

4.2 Technical assessment tests

In badminton competitions, movement technique is one of the pivotal skills that determines the success of a match. An athlete skilled in utilizing effective movement techniques can leverage speed to enhance shot effectiveness, creating unexpected situations for the opponent. To achieve this technical efficacy, besides physical fitness factors, athletes must understand how to move efficiently with efficient energy.

Such a badminton match requires constant movement with short steps, long strides, or jumping steps with the combination of fast and powerful shot executions, all of which are executed by lateral movement. Lateral movement, combined with low backhand and forehand shots, constitutes one of the techniques involving lateral movement coupled with right and left-sided defences and attacks. Hence, it is believed that when a player possesses good lateral movement capabilities, they will have versatile options for both offensive and defensive manoeuvres during badminton matches. This is why the research study chose the 20 lateral movements (seconds) test as a suitable means to assess the technical proficiency of the study subjects.

In a competition, badminton players must move laterally and up and down to either block the opponent’s attacking shots or execute a defensive shot from the backcourt. Hence, the test of back-and-forth blocking movements and shots in 1 minute (times) is appropriate to assess the badminton athlete’s back-and-forth blocking movement skills and shot execution in both offensive and defensive scenarios by the net or rear court.

The unpredictability also holds significant importance in winning. To achieve it, the players must execute overhead shots swiftly and precisely. Therefore, the research study opted for the test of overhead shots in one minute (times) to evaluate how quickly

players can perform such a manoeuvre, alongside the test of 40 jumps and shots (seconds) to assess their ability to execute a rally with a quick, powerful, and unexpected shot sequence.

In short, the research has determined eight tests for the assessment of the physical base and technical abilities of male badminton athletes from Can Tho University's team, including 20 lateral movements (seconds), back-and-forth blocking movements and shots in 1 minute (times), overhead shots in one minute (times), and 40 jumps and shots (seconds). These tests are aligned with those from previous studies of Thoa Ha Thi Kim (2007)[15], Cuong Nguyen Manh (2009)[4], Vinh Do (2011)[25], Hai Pham Van (2014)[7], Tien Hung Le (2008)[8], Hong Son Le (2005)[13], Vinh Huy Chau[9], Thanh Tung Mai (2007)[18], Xuan Thanh Nguyen (2007)[14].

5. Conclusion

Through the uses of literature synthesis, interviews, and reliability tests, the study has selected eight tests for the physical and technical assessment of male badminton athletes of the Can Tho University's team, as follows:

- **Physical assessment tests**: Long jump (cm), 30-second abdominal crunch (times), 30-meter sprint (seconds), 1-minute rope jump (times).
- **Technical assessment tests**: 20 lateral movements (seconds), Back-and-forth blocking movements and shots in 1 minute (times), Overhead shots in one minute (times), 40 jumps and shots (seconds).

Conflict of Interest Statement
The authors declare no conflicts of interest.

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