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Research on Physical Activity During Matches of the Female Athletes of the Ho Chi Minh City Basketball Team, Vietnam

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ABSTRACT: Basketball is a high-intensity sport that requires skill, strategy, and good coordination. In competitions, athletes frequently run fast, jump, and change directions continuously. Therefore, physical fitness plays an important role in maintaining movement efficiency, improving performance, and enhancing competitive ability. The purpose of the study is to identify observable signs that provide information about physical activity during matches of the female athletes of the Ho Chi Minh City basketball team, Vietnam. The research uses methods of document synthesis and analysis, interviews, pedagogical observation, and statistical mathematics. The subjects participating in the observation are 16 female athletes from the Ho Chi Minh City basketball team and 20 individuals who are experts, managers, coaches, and basketball lecturers in Ho Chi Minh City, Can Tho, and Soc Trang. The research results identified 20 observable physical fitness indicators of the research subjects, including: Speed (4 indicators), Strength (4 indicators), Endurance (2 indicators), Flexibility – Agility (4 indicators), Mixed (6 indicators). The observation results show that the physical fitness of the female athletes of the Ho Chi Minh City basketball team, Vietnam, is quite good in terms of speed, slightly weak in endurance and strength, flexibility and agility, with a mix of physical qualities at an average level.

KEYWORDS: Physical activity, in competitions, female athletes, basketball, Ho Chi Minh City, Vietnam.

1. INTRODUCTION

Modern basketball is a high-intensity contact sport characterized by activities such as sprinting, jumping, changing direction, contesting, and tactical coordination that occur continuously under significant pressure in terms of time and playing space. In a match, athletes must frequently perform sprints, sudden stops, transitions between offense and defense, and technical maneuvers while being subjected to strong impacts from opponents. Therefore, physical fitness is considered an important foundation that determines the effectiveness of technique, tactics, and the performance of basketball players (McInnes et al., 1995; Montgomery et al., 2010) [1], [2].

In basketball, physical qualities do not exist independently but always have a close relationship, directly supporting the effectiveness of professional activities. Speed helps athletes increase their ability to move, react, and transition between competitive states; Strength and explosive strength play an important role in situations involving jumping for the ball, shooting, and defense; Endurance helps maintain exercise intensity, technical stability, and tactical consistency throughout the match; while flexibility and coordination contribute to improving technical performance and reducing injuries. According to Drinkwater et al. (2008) [3] and Mancha-Triguero et al. (2019) [4], athletes with good physical fitness levels will maintain high performance, enhance ball contest efficiency, execute quick counterattacks, and perform techniques accurately under stressful competition conditions.

In addition, physical fitness is also the foundation for athletes to adapt to the high levels of physical activity in modern training and competition. The development of basketball tactics today, following the trend of fast-paced, high-intensity play, has significantly increased the demands on the functional capabilities of athletes' bodies, especially in areas of speed strength, specialized endurance, and recovery ability. In modern women's basketball, the demands for speed, jumping ability, and maintaining continuous movement intensity are increasingly high to meet the characteristics of flexible play and quick transitions. (Scanlan et al., 2012; Reina et al., 2020) [5], [6]. If the appropriate level of physical fitness is not ensured, athletes will experience a decrease in technical performance, limited tactical coordination, and a higher likelihood of fatigue in the later stages of the match.

Many research studies, both domestically and internationally, have confirmed the close relationship between physical fitness levels and the effectiveness of basketball performance. Russell et al. (2021) [7] argue that assessing physical activity in competition is significantly

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important in controlling the amount of movement, building a training program, and improving competition performance. Nguyen Truong Dong and Thai Viet Hung (2023) [8] also emphasize that specialized endurance is a factor that helps athletes maintain movement efficiency, stabilize technical-tactical performance, and enhance their competitive ability throughout the entire match. Thus, studying physical activity in competition not only reflects the characteristics of specialized movement but also serves as an important scientific basis for developing appropriate training content, methods, and exercise volume for basketball players.

In Vietnam, along with the development of high-performance sports, women's basketball is making significant strides in terms of training scale, the number of participating athletes, and the quality of competitive expertise. Many localities have focused on investing in youth training systems, improving the quality of coaching, and expanding professional tournaments, contributing to the development of women's basketball in a more professional direction. Among them, Ho Chi Minh City is considered one of the strongest basketball training centers in the country, frequently contributing athletes to the national team and achieving high results in national championships. The training work here is increasingly aligning with modern trends, with high demands on the technical, tactical, and professional physical fitness levels of athletes (Ho Chi Minh City Basketball Federation, 2016) [9].

However, in light of the increasing demands of modern basketball, especially the trend of high-speed play, continuous state transitions, and increased intensity of movement in women's competitions, the study of physical activity characteristics in actual competitions has not received corresponding attention. Most of the current domestic research primarily focuses on assessing general physical fitness levels, selecting evaluation tests, or applying exercises to develop physical qualities such as strength, speed, and endurance for basketball players (Nguyen Thi Minh Cam, 2010; Dang Ha Viet, 2007; Huynh Long Bao, 2015; Dinh Dac Thi, 2020) [10], [11], [12], [13]. These studies, while valuable in guiding specialized physical training, do not fully reflect the movement characteristics of athletes under actual competition conditions, such as movement frequency, activity intensity, the ability to repeat high-speed movements, or the changes in physical condition during different stages of the match.

Meanwhile, international studies show that physical activity in basketball competitions has a direct correlation with the athletes' professional performance and tactical adaptability. McInnes et al. (1995) [1], Scanlan et al. (2012) [5], and Russell et al. (2021) [7] confirm that analyzing movement characteristics and the amount of movement in competitions helps coaches develop training programs that align with practical requirements, effectively monitor functional states, and optimize athletes' specialized movement abilities. Especially for women's basketball, factors such as acceleration, change of direction, repeated jumping, and maintaining high exercise intensity play a crucial role in performance effectiveness in the context of increasingly fast-paced games and higher levels of resistance (Reina et al., 2020) [6].

Based on the aforementioned theoretical and practical significance, the implementation of the topic: *"Research on physical activity during matches of the female athletes of the Ho Chi Minh City basketball team, Vietnam"* is necessary, contributing to providing a scientific basis for training, controlling the amount of exercise, and enhancing the competition performance of female basketball players.

2. METHODOLOGY

Research Methods:

Documentary research method

This method aims to systematically collect and organize knowledge related to the research field, helping to build the theoretical foundation for the study; select research methods; formulate scientific hypotheses, determine research objectives, and discuss research results during the thesis implementation process. This method allows for the collection of additional materials and data to verify and compare with the data obtained during the research process.

Pedagogical observation method

This method aims to collect information related to the thesis via observation. In the thesis, this method is used to collect information related to the physical activity indicators of the research subjects. The thesis proceeds to develop a survey form by consulting experts, specialists, managers, coaches, and lecturers to refine the survey form. Conduct observations of the physical activity indicators of the female athletes of the Ho Chi Minh City basketball team during 06 matches of the National Basketball Championship based on the athletes' performance of the indicators as either achieved or not achieved. The information obtained serves as the basis for evaluating the physical fitness of the research subjects.

Interview method:

Used in the research process to consult experts both domestically and internationally who are currently directly involved in managing and coaching basketball in our country, such as districts in Ho Chi Minh City, provinces and cities nationwide, and clubs... to collect information to determine the criteria for observing physical activity during a match. Through the compilation of interview forms and consultation with experts and coaches to select criteria for observing physical activity in the matches of the female athletes of the Ho Chi Minh City basketball team, Vietnam.

Statistical methods:

The study uses this method to process and analyze the information obtained from the pedagogical observation method. In data processing, we use SPSS 22.0 software.

Research subjects:

- 16 female athletes from the Ho Chi Minh City basketball team were selected using convenience and judgment sampling methods.

Average age: 23.5 ± 3.54 years old (maximum 30 years old and minimum 20 years old)

Average height: 169.25 ± 4.77 cm

Average weight: 64.75 ± 5.56 kg.

Interview subjects: 20 people, including 04 experts and management staff, 10 coaches, and 06 basketball lecturers in Ho Chi Minh City, Can Tho, and Soc Trang.

3. RESULTS AND DISCUSSION

3.1. Choosing indicators to observe the physical activities of female basketball players, Ho Chi Minh City, Vietnam.

The study proceeds to select observational indicators in two steps:

Step 1: Compile the observed indicators of physical activity during a basketball match from various sources.

Step 2: Interview experts, coaches, and professionals with experience in basketball coaching.

Summarize the observed signs of physical activity during a basketball game from various sources.

The research conducted a review and synthesis of several documents on physical training in basketball practice and competition by authors such as: Le Minh Chi (2010) [14], Pham Tuan Dat (2016) [15], Nguyen Truong Dong, Thai Viet Hung (2023) [8], Trat Thị Nguyệt Nga (2017) [16], Aksović, N., et. al (2021) [17], Čaušević, D., et.al (2023) [18], DE FORÇA, S. T.,et.al (2023) [19], Ewing, P. (2019) [20], Ge, Z., et.al (2022) [21], Gómez-Carmona, C. D., et.al (2021) [22], Hudain, M. A., (2023) [23], Liu, W. (2024) [24], Wang, L., & Wang, J. (2023) [25].

The results were compiled through direct observation of basketball matches and consultation with experts, specialists, and basketball coaches; the compiled results included 23 observed indicators, consisting of:

Speed includes the following signs: Quick passing (pass the ball immediately), Quick dribbling, Quick movement, Quick running, Quick shooting (shoot immediately after receiving the ball).

Strength includes the following indicators: high ball contest, low ball contest, rebound contest, blocking opponent's attack (position blocking, player blocking), long-distance throw (over 7m).

Endurance includes signs: Observing the athlete's performance at the end of the match in terms of (coordination with teammates, movement on the field, shooting ability, marking, ball contention...) (facial expression, sweating, psychological and physiological signs...).

Flexible – Skillful: Steal the ball from the opponent, shoot from under the basket (hook shot, layup), move to cut toward the basket (cut run), dribble past the opponent, run to occupy a favorable position in the area under the basket.

Mixed: Drive to the basket, 1-on-1 (full court, half court), Fast break, 3-point shooting movement, 2-point shooting movement, Free throws, Shooting coordination.

Interview experts, coaches, and professionals with experience in basketball coaching.

From the above summary results, the study developed a questionnaire and conducted interviews with the responses scored as follows: Very necessary: 5 points, Necessary: 4 points, Neutral: 3 points, Unnecessary: 2 points, Very unnecessary: 1 point. Interviewed 20 people, including 4 experts, with managers accounting for 20%, 10 coaches accounting for 50%, and 6 basketball specialists accounting for 30%. The interview results are presented in Table 3.1.

Table 3.1. Results of the interview on the observed physical signs of female athletes from the Ho Chi Minh City basketball team, Vietnam.

	Observation signs	Total score	Percentage
	Speed strength:		
1	Quick passing (pass the ball immediately)	86	86
2	Quick dribbling	84	84
3	Quick movement	88	88
4	Quick running	72	72
5	Quick shooting (shoot immediately after receiving the ball)	90	90
	Strength		
6	High ball Contest	87	87
7	Low ball Contest	88	88
8	Rebound contest	85	85
9	Blocking opponent's attack (position blocking, player blocking)	89	89
10	Long-distance throw (over 7m)	71	71
	Endurance		
11	Observing the athlete's performance at the end of the match in terms of (coordination with teammates, movement on the field, shooting ability, marking, ball contention...) (facial expression, sweating, psychological and physiological signs...).	96	96
	Flexibility – Skillful		
12	Steal the ball from the opponent	88	88

13	Shoot from under the basket (hook shot, layup)	89	89
14	Move to cut toward the basket (cut run)	85	85
15	Dribble past the opponent	86	86
16	Run to occupy a favorable position in the area under the basket	68	68
	Mixed Strength		
17	Drive to the basket	87	87
18	1-on-1 (full court, half court)	89	89
19	Fast break	88	88
20	3-point shooting movement	86	86
21	2-point shooting movement	88	88
22	Free throws	89	89
23	Shooting coordination	89	89

The data in Table 3.1 of the study selected indicators that were chosen by experts, managers, coaches, and lecturers with scores above 80 points (80%). The research results selected 20 indicators to observe the physical fitness of the research subjects, including:

Speed includes the following signs: Quick passing (pass immediately), Quick dribbling, Quick movement, Quick shooting (shoot immediately after receiving the ball).

Strength includes the following indicators: High ball contest, Low ball contest, Rebound contest, Blocking opponent's attack (position blocking, player blocking).

Endurance includes signs: Observing the athlete's performance at the end of the match in terms of (coordination with teammates, movement on the field, shooting ability, marking, ball containment...) (facial expression, sweating, psychological and physiological signs...).

Flexible – Skillful: Steal the ball from the opponent, shoot from under the basket (hook shot, layup), move to the basket (cut), dribble past the opponent.

Mixed: Drive to the basket, 1-on-1 (full court, half court), Fast break, 3-point shooting movement, 2-point shooting movement, Free throws, Shooting coordination.

3.2. The current state of physical activity during matches of the female athletes of the Ho Chi Minh City basketball team, Vietnam.

The study conducted the development of an observation sheet and carried out observations; compiled the observation results of the indicators categorized by match rounds (first leg, second leg, and overall) through Table 3.2.

Table 3.2. Summary of the observed signs of physical activity of the female athletes of the Ho Chi Minh City basketball team in the National Basketball Championship

Signs, physical condition	COMPILATION					
	Total number		Pass		Fail	
	Quantity	%	Quantity	%	Quantity	%
Speed strength	2192	100.0	1829	74.5	363	25.5
- Quick passing (pass the ball immediately)	1435	100	1283	89.4	152	10.6
- Quick Dribbling,	271	100	212	78.2	59	21.8
- Quick Movement,	307	100	241	78.5	66	21.5
- Quick shooting (shoot immediately after receiving the ball)	179	100	93	52.0	86	48.0
Strength	513	100	288	55.9	225	44.1
- High ball contest	106	100	55	51.9	51	48.1
- Low ball contest	104	100	60	57.7	44	42.3
- Rebound contest	176	100	102	58.0	74	42.0

- Blocking opponent's attack (position blocking, player blocking)	127	100	71	55.9	56	44.1
Endurance	48	100	23	47.9	25	52.1
Endurance includes signs: Observing the athlete's performance at the end of the match in terms of (coordination with teammates, movement on the field, shooting ability, marking, ball contention...) (facial expression, sweating, psychological and physiological signs...).	48	100	23	47.9	25	52.1
Flexibility – Skillful	481	100	233	50.2	248	49.8
- Steal the ball from the opponent	78	100	50	64.1	28	35.9
- Shoot from under the basket (hook shot, layup)	94	100	40	42.6	54	57.4
- Move to the basket (cut movement)	169	100	65	38.5	104	61.5
- Dribble past the opponent	140	100	78	55.7	62	44.3
Mixed	1126	100	627	52.6	499	47.4
- Drive to the basket	175	100	75	42.9	100	57.1
- 1-on-1 (full court, half court)	306	100	236	77.1	70	22.9
- Fast break	96	100	44	45.8	52	54.2
- 3-point shooting movement	123	100	49	39.8	74	60.2
- 2-point shooting movement	152	100	59	38.8	93	61.2
- Free throws	68	100	45	66.2	23	33.8
- Shooting coordination	206	100	119	57.8	87	42.2

The data in Table 3.2 shows that in terms of speed, there are 2,192 active indicators with a pass rate of 74.5%; among them, the quick pass indicator (with an immediate pass) has the highest pass rate at 89.4%, and the quick shot indicator has the lowest pass rate at 52.0%; the remaining indicators have a pass rate above 78%.

In terms of strength, there are 513 active indicators, with a pass rate of 55.9%; among them, the rebound contest has the highest pass rate at 58.0%, and the high ball contest has the lowest pass rate at 51.9%; the remaining indicators have a pass rate above 55%.

Regarding endurance, there were 48 instances of athletes observed, with a success rate of 47.9%.

Regarding flexibility and dexterity, there are 481 active indicators, with a pass rate of 50.2%; among them, the indicator for taking the ball from the opponent has the highest pass rate at 64.1%, and the indicator for cutting toward the basket has the lowest pass rate at 38.5%; the remaining indicators have a pass rate above 42%.

Regarding the mixed signals, there are 1126 activity indicators with a pass rate of 52.6%; among them, the 1-on-1 signals (full court, half court) have the highest pass rate at 77.1%, and the 2-point shot movement has the lowest pass rate at 38.8%; the remaining signals have a pass rate above 39%.

Based on the above analysis, it shows that the physical condition of the female athletes of the Ho Chi Minh City basketball team, Vietnam, has the best speed and the weakest endurance. Through observation, it shows that the physical condition of the research subjects is quite good in terms of speed, slightly weak in endurance and strength, flexible and skillful, and has a mixed level of physical qualities at an average level.

DISCUSSION

The research results have selected 20 indicators to observe the physical activities of female athletes on the Ho Chi Minh City basketball team, Vietnam, via literature review and interviews with experts, coaches, and basketball lecturers. The selected indicators belong to 5 groups of qualities, including speed, strength, endurance, flexibility – dexterity, and mixed qualities, suitable for the comprehensive movement characteristics of modern basketball. According to Aksović et al. (2021) [17] and Gómez-Carmona et al. (2021) [22], basketball competition requires athletes to coordinate various physical qualities under conditions of high intensity and continuous change.

The interview results show that most indicators reached a high level of agreement above 80%, especially the indicator for observing athlete performance at the end of the match, which reached 96%, quick shooting reached 90%, and indicators such as blocking opponent's attack, one-on-one, and coordinated shooting all reached 89%. This shows that experts value the role of maintaining effective movement and technical handling under stressful competition conditions. According to Ewing (2019) [20], the end-of-game professional performance clearly reflects the level of professional endurance and the ability to maintain functional status of the athlete.

The results of observing the current state of physical activity reveal that speed is the most prominent quality, with an achievement rate of 74.5%, among which quick passing reached the highest at 89.4%. This reflects the athletes' relatively good ability to organize attacks and transition quickly. The results align with Liu's (2024) assertion [24] that ball handling speed and quick counterattacks are important factors in modern basketball. However, the quick shooting percentage was only 52.0%, indicating limited effectiveness in finishing situations under pressure. Wang, L., and Wang, J (2023) [25] argue that shooting accuracy is significantly affected by fatigue and motor coordination.

In the strength group, the pass rate is only 55.9%, with the high ball contest being the lowest at 51.9%. This indicates that the athletes' resistance and jumping ability are still limited. According to Ge et al. (2022) [21], explosive strength and jumping ability play a decisive role in ball disputes and rebounds in women's basketball.

Endurance is the weakest attribute with a pass, rate of 47.9%. Based on the observation, the athletes showed a decrease in coordination, movement, and ball containment efficiency toward the end of the match. This result is consistent with the study by Gómez-Carmona et al. (2021) [22], which suggests that the decline in performance at the end of the game is a common characteristic in female basketball teams with uneven physical fitness levels.

The flexible and skillful group achieved 50.2%, with the lowest cut movement toward the basket at 38.5%. This reflects the limited ability to move without the ball and make strategic positioning choices. According to Hudain (2023) [23], the effectiveness of off-the-ball movement largely depends on the coordination of the neuromuscular system and tactical thinking.

In the mixed attribute group, the overall success rate is 52.6%, with one-on-one success at the highest rate of 77.1%, but the movement for 2-point and 3-point shots is both below 40%. The results show that the athletes have relatively good individual handling skills, but their effectiveness in finishing situations while moving is still limited. According to Aksović et al. (2021) [17], the technique of shooting while moving requires a high level of coordination between speed strength, balance, and spatial orientation ability.

In general, the female athletes of the Ho Chi Minh City basketball team have a speed advantage but are still limited in strength, endurance, and specialized movement coordination. Therefore, in training, it is necessary to focus on developing specialized endurance, explosive strength, and coordination exercises under simulated competition conditions to enhance physical performance and competition results.

4. CONCLUSION

The research results selected 20 indicators to observe the physical fitness of the research subjects, including: Speed (4 indicators), Strength (4 indicators), Endurance (2 indicators), Flexibility and Skillful (4 indicators), Mixed (6 indicators).

The physical condition of the research subjects is quite good in terms of speed, relatively weak in endurance and strength, flexible and skillful, with a mixed level of physical qualities at an average level.

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