



Developing a sport-specific physical fitness for the male youth volleyball team of Sanest Khanh Hoa, Vietnam

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Abstract

In sports training in general, and volleyball training in particular, alongside technical, tactical, and psychological preparation, sport-specific physical conditioning plays an equally crucial role. It represents a specialized motor capacity focused on developing essential physical qualities, strength, speed, endurance, and coordination, to meet the specific technical and tactical demands of each sport. It serves as the foundation for athletes to achieve peak performance through systematic and purposeful training.

Therefore, based on the overall training framework, this study developed a sport-specific physical conditioning plan for the male youth volleyball team of the Sanest Khanh Hoa Club, Vietnam. Through a structured research process, the study identified four evaluation tests and 35 exercises aimed at enhancing sport-specific physical fitness.

After one year of experimental application, the results demonstrated a significant improvement, with growth rates (W%) ranging from 4.79% to 34.11%. The observed improvements were statistically significant at the $p < 0.05$ threshold, indicating a high level of reliability.

Keywords: sport-specific physical conditioning, physical fitness assessment, volleyball-specific fitness, youth volleyball Khanh Hoa, Vietnam

Introduction

Physical training (also referred to as the process of training general and sport-specific physical qualities) is a continuous and systematic process carried out according to a well-structured plan through the use of sports exercises aimed at developing physical qualities and motor abilities. This process has a profound impact on the nervous system, muscular system, as well as on the internal organs of the human body (Harre. 1996) ^[4]. Of course, to achieve outstanding performance in volleyball, athletes must first possess solid technical skills, tactical thinking, and motor skills. Most importantly, they must have good physical qualities that meet the specific demands of the sport. Generally, physical qualities are divided into five basic components: speed, strength, endurance, coordination ability (agility), and flexibility (Daxioroxki. 1978) ^[2].

In sports in general, and volleyball in particular, many physical qualities are required. For example, in the overhead set technique, maximum strength is needed to send the ball over a long distance. However, to perform a good serve reception (first pass), defense, or blocking, in addition to anticipation, players must move quickly and choose appropriate positions to execute the technique effectively, this requires speed (movement speed and reaction speed). To spike the ball powerfully and quickly, or to jump high for blocking, explosive strength is essential. Moreover, to maintain all techniques such as serving, serve reception, setting, spiking, blocking, and defense throughout the duration of a match, speed-strength endurance is necessary. Therefore, volleyball is a sport that requires the comprehensive development of all motor qualities.

To achieve high performance in competitive volleyball, in addition to technical, tactical, psychological, and general physical training, sport-specific physical conditioning plays a critically important role. It contributes to enhancing match

performance efficiency, increasing tolerance to high-intensity efforts during continuous rallies within each set and throughout the entire match, reducing recovery time between matches and between competitive phases, and enabling athletes to maintain stable performance levels.

Furthermore, sport-specific conditioning improves strength and endurance capacities by developing specialized strength (rhythmic and coordinated strength required for jumping and spiking actions), enhancing cardiovascular endurance, and increasing muscular tolerance under conditions of accumulated fatigue. It also contributes to technical execution by establishing an optimal physical foundation for performing key volleyball skills such as spiking, blocking, serve reception, and setting. Improved physical conditioning helps reduce technical errors caused by fatigue and maintain accuracy during the later stages of a match. In addition, sport-specific physical training reduces injury risk by improving balance, joint stability, and periarticular muscle strength, particularly around the knees, elbows, and ankles, thereby minimizing overload injuries and impact-related trauma. It enhances recovery capacity and lowers the likelihood of muscle strains or sprains when executing high-intensity movements at rapid tempos. Moreover, physical preparedness positively influences psychological and tactical performance. Athletes with superior physical conditioning demonstrate greater confidence, sustained concentration, and improved decision-making under high-pressure situations. Effective breathing control and psychological regulation during critical moments contribute to overall team stability and competitive resilience.

For these reasons, and based on the general annual training plan, the author developed a sport-specific physical conditioning program for the male youth volleyball team of Sanest Khanh Hoa, Vietnam. The program aims to support

comprehensive training development and contribute to improved competitive performance outcomes.

Research Methods

To accomplish the research objectives, the author employed the following research methods:

Document review and analytical synthesis method: This method was used to systematically review and synthesize relevant scientific literature in order to formulate the research hypothesis, identify the research tasks, establish the theoretical foundation, and provide orientation for the development of an evaluation test system assessing training level, as well as for the selection and proposal of appropriate exercises for volleyball athletes.

Questionnaire-based interview method: A structured questionnaire was administered to investigate issues related to the research objectives. This method was employed to collect expert opinions and coaching perspectives in order to identify appropriate evaluation tests for assessing physical training levels and to select suitable exercises for the male youth volleyball team of Sanest Khanh Hoa, Vietnam. The interview sample consisted of 30 respondents, including coaches from various volleyball teams and experts with substantial knowledge and experience relevant to the research topic.

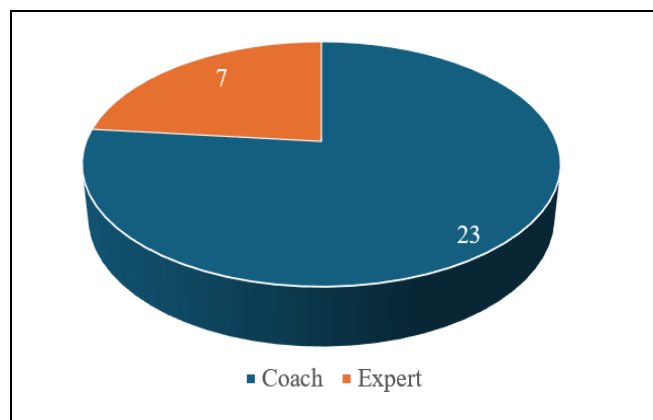


Chart 1: Number of participants involved in the interview

Pedagogical testing method: A set of sport-specific physical fitness assessment tests was employed, including four evaluation tests: Approach vertical jump (cm), block jump height (cm), repeated approach jump spike test (number of successful hits-repetitions), 9–3–6–3–9 shuttle run test (s). This test battery was applied to assess the athletes' current sport-specific physical condition and to evaluate changes following the experimental training intervention conducted with the male youth volleyball team of Sanest Khanh Hoa, Vietnam.

Mathematical statistics method: Statistical methods were used to process the collected data, including calculation of the mean, standard deviation, percentage values, etc (Nguyen Thanh Lam & Nguyen Hoang Minh Thuan. 2009) ^[10].

Research subject: The research focused on the development of a sport-specific physical conditioning training plan for the male youth volleyball team of Sanest Khanh Hoa, Vietnam.

Theoretical Basis

Sports training planning is a systematic process aimed at preparing athletes comprehensively in terms of technique, tactics, psychology, and physical fitness in order to achieve optimal competitive performance. As the primary objective of sports training is competitive success, the planning process must be derived from the specific demands of competition as well as from the requirements related to training load. The fundamental tasks of sports training originate from the structure of athletic performance (Le Buu *et al.* 1983 ^[6]); (Harre. 1996) ^[4]. Within this framework, physical exercises constitute the principal means of sports training and represent the most essential tool for performance enhancement. Training exercises must align with the objectives of the training process and be applied selectively. The purposefulness of high-performance training exercises is reflected in their direct contribution to improving sport-specific performance, satisfying the long-term performance structure, enhancing tolerance to progressively increasing training loads, and accelerating athletic development.

Sport-specific physical conditioning is inherently linked to the acquisition and refinement of technical skills. The comprehensive development of physical qualities significantly influences the enhancement of other performance components in accordance with the specific characteristics of volleyball. It directly affects the learning and execution of technical skills, as well as the overall determinants of high-level performance. Therefore, throughout the physical training process, systematic testing and evaluation must be integrated to monitor athletes' developmental progress and ensure training effectiveness. Recognizing the value, significance, and importance of this issue, numerous scholars have conducted research and published findings. (Philin. 1996) ^[13]; (Nguyen Toan. 1998) argued that physical qualities develop in stages and unevenly, depending on specific age periods. Therefore, coaches must not only thoroughly understand the natural laws of development such as particularly sensitive periods (critical windows for the development of physical qualities), but also possess an in-depth understanding of age-related characteristics in the development of physical capacities for each individual athlete. According to (Phomin. 1987); (Philin. 1996) ^[13], (Harre. D. 1996); (Novikov and Matveev. 1980), regardless of the stage in the athlete training process, general physical conditioning plays a pivotal role. General physical fitness, together with sport-specific physical fitness, is considered the fundamental foundation for achieving high athletic performance.

Another equally important issue is that the physical training process must ensure congruence between training means (physical exercises) and applied training methods, aligning them with the developmental characteristics of the target population (age, training level, etc.) (Phomin. 1987 ^[14]); (Novikov & Matveev. 1980) ^[7].

Physical training, also referred to as the development of general and sport-specific physical qualities, is a continuous, systematic, and well-structured process implemented through physical exercises to enhance functional capacities and motor abilities. However, to achieve excellence in volleyball, athletes must first possess well-developed physical qualities that correspond to the specific demands of the sport.

In addition, several studies have addressed the teaching and training of technical skills, tactics, and sport-specific physical conditioning for volleyball students and athletes, such as those conducted by (Do Thi Vinh Linh. 2012); (Nguyen Thanh Lam. 1998); (Nguyen Bao Ninh. 2007). These studies systematized technical training exercises (particularly spiking techniques) as well as psychological and sport-specific physical training exercises for volleyball athletes. They also developed structured training loads, physical conditioning programs for different phases and training cycles, and calculated the proportional distribution of exercise types to ensure alignment with the annual training plan and suitability for the target population (Nguyen Thi Thu Nhlen. 2013)^[12].

It can be affirmed that, although research in this area remains relatively limited, the aforementioned studies provide valuable foundational references in terms of documentation, orientation, and research methodology for the teaching and training of technical-tactical skills and sport-specific physical qualities in volleyball athletes.

Table 1: Results of the first physical fitness assessment (baseline test) of the male youth volleyball team of Sanest Khanh Hoa, Vietnam

No.	Test			Cv%
1	Repeated approach jump spike test (repetitions)	7.50	0.77	10.25%
2	9–3–6–3–9 shuttle run test (s)	8.81	0.23	2.61%
3	Approach vertical jump (cm)	320.75	5.56	2.6%
4	Block jump height (cm)	311.83	7.7	2.47%

The results of the initial assessment indicate a relatively homogeneous distribution of sport-specific physical fitness levels among the athletes in 3/4 tests, as the coefficient of variation (Cv%) < 10%. Only one indicator the repeated approach jump spike test showed greater dispersion, with a Cv% > 10% (Cv = 10.25%), reflecting a moderate variability in performance among the athletes for this specific test.

2. Selection of sport-specific physical conditioning exercises for the male youth volleyball team of Sanest Khanh Hoa, Vietnam

Based on a review of both domestic and international literature related to the research topic, a total of 62 exercises were initially compiled and proposed. Following interviews with 30 experts and volleyball coaches, 35 exercises were selected as being appropriate for the male youth volleyball team of Sanest Khanh Hoa, Vietnam:

- **Flexibility development exercises (10 exercises):** Trunk flexion, knee stretching, overhead shoulder stretching, back stretching, wrist stretching, front split stretching, side split stretching, backward shoulder stretching left and right, trunk rotation, and bilateral leg stretching.
- **Speed, agility, and coordination exercises (6 exercises):** Sprint running, 9–3–6–3–9 shuttle run, lateral movement running, defensive diving drills, rope skipping, and movement drills combined with ball passing.
- **Strength training exercises (14 exercises):** Barbell wrist curls; supine bench press; overhead triceps exercises; barbell squats; supine leg press; seated leg

Results and Discussion

1. Selection of sport-specific physical fitness assessment tests for the male youth volleyball team of Sanest Khanh Hoa, Vietnam

In order to select appropriate sport-specific physical fitness tests for the male youth volleyball team of Sanest Khanh Hoa, Vietnam, the author collected, reviewed, and systematized various assessment tests that have been applied both domestically and internationally. After eliminating overlapping or redundant tests, interviews were conducted with coaches and experts to identify the most suitable test battery for evaluating sport-specific physical performance in volleyball. Based on this procedure, four assessment tests were selected to evaluate the development of sport-specific physical qualities in the athletes: *Approach vertical jump (cm)*, *block jump height (cm)*, *repeated approach jump spike test (repetitions)*, *9–3–6–3–9 shuttle run test (s)*. These four tests were applied to assess athletes' physical fitness levels before and after the experimental training intervention conducted with the male youth volleyball team of Sanest Khanh Hoa, Vietnam.

flexion–extension with weights; two-leg box jumps (60 cm); single-leg box jumps (40 cm); hurdle jumps combined with spiking; loaded squat jumps; hurdle jumps; resistance band pull (overhead, dominant hand); abdominal exercises; back extension exercises.

- **Endurance training exercises (5 exercises):** 2,500 m continuous running, continuous spiking drills, continuous defensive drills, continuous blocking drills, and defensive-to-offensive transition drills.

3. Development of the sport-specific physical conditioning plan for the male youth volleyball team of Sanest Khanh Hoa, Vietnam

3.1 Training plan for cycle 1

The training program was implemented over one macrocycle lasting 24 weeks and was divided into two phases: the general preparation phase and the specific preparation phase. The general preparation phase was conducted from Week 1 to Week 8. Following this phase, the author developed the training plan for the Specific Preparation Phase, which was implemented from Week 9 to Week 24, as follows:

Development of the Training Progression:

Table 2: Physical conditioning training progression during the specific preparation phase

No.	Day Content	2	3	4	5	6	7
1	Flexibility	x	x	x	x	x	x
2	Speed, agility and coordination	x	x	x	x	x	
3	Strength		x		x		x
4	Endurance	x		x			x

Flexibility training during the general preparation phase: Flexibility exercises were incorporated at the beginning of each training session, following the general warm-up. The total duration of flexibility training was 10

minutes per session, with 8–10 exercises performed. Each exercise was executed for 8 seconds, with a 3-second hold, and a 30-second rest interval between exercises.

Table 3: Flexibility development program during the specific preparation phase

Training content	Sets	Repetitions	Intensity	Rest interval
Trunk flexion, knee stretching, upper shoulder stretching, back stretching, wrist stretching, longitudinal stretch, lateral stretch, backward shoulder stretch (left–right), trunk rotation, bilateral leg stretching	1	1	low	30 seconds

Speed, agility, and coordination training during the specific preparation phase: Speed training exercises were performed at the beginning of each training session, following the general warm-up and flexibility exercises. The

duration was 15 minutes per session, including 3–5 exercises per session, and the repetition method was applied.

Table 4: Speed, agility, and coordination development program during the specific preparation phase

No.	Training content	Sets	Repetitions	Intensity	Rest interval (minute)
1	20-m sprint	4	1	High	1-2
2	9-3-6-3-9	2	2	High	1-2
3	Lateral movement drills	2	2	High	1-2
4	Defensive digging drills	5	4	High	1-2
5	Moving set drills	5	4	High	1-2

Strength training during the specific preparation phase: Training was organized according to the periodization model proposed by Bompá (2000), focusing on the maximum strength phase. During the explosive strength phase, the program included: three upper-body exercises,

three lower-body exercises, and two trunk exercises. Training intensity ranged from 85–100% of 1RM (one-repetition maximum) in the maximum strength phase. The number of sets ranged from 3–5 sets, with a total training volume reaching 15–20 repetitions.

Table 5: Strength development program during the specific preparation phase

No.	Training Content	Maximal Strength (Weeks 9–16)	Explosive Strength (Weeks 17–24)	Rest Interval (minutes)
1	Barbell Back Squat	90/3, 95/2, 100/1 15, 10, 8	70/3, 80/2, 85/1 20, 15, 10	1–3
2	Barbell Jump Squat	90/3, 95/2, 100/1 15, 10, 8	70/3, 75/2, 80/1 20, 15, 10	1–3
3	Supine Leg Press	90/3, 95/2, 100/1 15, 10, 8	70/3, 75/2, 80/1 20, 15, 10	1–3
4	Two-leg box jumps (60 cm)	20 reps / 3 sets	15 reps / 5 sets	1–3
5	Single-leg box jumps	20 reps / 3 sets	15 reps / 5 sets	1–3
6	Hurdle jumps combined with spiking	Jump over 50 cm hurdle + 3 spikes / 3 sets	Jump over 5 hurdles (60 cm) + 5 spikes / 3 sets	1–3
7	Abdominal exercises	30 s / 3 sets	40 s / 3 sets	1–3

Endurance training during the specific preparation phase: The training duration ranged from 15–20 minutes per session and was conducted on Mondays and Wednesdays each week.

Table 6: Endurance development program during the specific preparation phase

No.	Training content	Sets	Repetitions	Intensity	Rest interval (minute)
General endurance					
1	2,500 m run	1	1	Medium-low	>5
Sport-specific endurance					
2	Continuous spiking drills	4	15 reps	High	5
3	Continuous defensive drills	5	10 reps	High	5
4	Continuous blocking drills	5	15 reps	High	5

Evaluation of the development of specialized physical fitness of the Khanh Hoa youth men's volleyball team after the first training cycle: The results presented in Table 7 indicate that after one training cycle, the physical fitness level of the Khanh Hoa youth male volleyball players showed a clear and significant improvement in both general physical fitness and sport-specific physical fitness. Table 7. Specialized physical fitness of the Khanh Hoa youth men's volleyball team after one training cycle (n = 12)

The comparative results of the specialized physical fitness of the Khanh Hoa youth men's volleyball team after one training cycle showed a clear improvement. The highest growth rate was observed in the continuous approach jump spike test, with W% = 18.64%, while the lowest growth rate was recorded in the approach vertical jump test, with W% = 2.59%. These improvements were statistically significant, as calculated > t_{table} at the p < 0.05 significance level.

Table 7

No.	Test	Indicator							
					Cv		W%	T	p
1	Run and jump to hit the ball repeatedly (repetitions)	first time	5.88	0.801	13.64	0.06	18.64	8.40	<0.05
		second time	7.08	0.6	8.42	0.03			
2	9–3–6–3–9 shuttle run test (s)	first time	8.81	0.23	2.61	0.01	4.31	5.57	<0.05
		second time	8.44	0.32	3.82	0.01			
3	Approach vertical jump (cm)	first time	320.75	5.56	1.73	0.01	2.59	12.0	<0.05
		second time	329.17	5.91	1.79	0.01			
4	Block jump height (cm)	first time	311.83	7.71	2.47	0.01	3.85	14.06	<0.05
		second time	324.08	8.33	2.57	0.01			

3.2 Specialized physical fitness training plan for cycle 2

The specialized physical fitness training plan for cycle 2 (24 weeks) was also divided into two phases: general preparation phase and specific preparation phase. The specific preparation phase was implemented from Week 9 to Week 24, following the completion of the general preparation phase.

Flexibility training during the specific preparation phase: Flexibility exercises were implemented at the beginning of each training session, immediately following the general warm-up. The training duration was 10 minutes per session. Athletes performed 8–10 exercises per session, with each exercise executed for 8 seconds, followed by a 3-

second hold. The rest interval between exercises was 30 seconds.

Development of the Training Progression

Table 8: Physical fitness training progression during the specific preparation phase

No.	Day Content	2	3	4	5	6	7
1	Flexibility	x	x	x	x	x	x
2	Speed, agility and coordination	x	x	x	x	x	
3	Strength		x		x		x
4	Endurance	x		x			x

Table 9: Flexibility development program during the specific preparation phase

Training content	Sets	Repetitions	Intensity	Rest interval
Trunk flexion, knee stretching, upper shoulder stretching, back stretching, wrist stretching, longitudinal stretch, lateral stretch, backward shoulder stretch (left–right), trunk rotation, bilateral leg stretching	1	1	Low	30 seconds

Speed, agility, and coordination training during the specific preparation phase: Speed training exercises were performed at the beginning of each training session, following the general warm-up and flexibility exercises.

The training duration was 15 minutes per session, including 3–5 exercises per session. The repetition method was applied to develop speed, agility, and coordination capacities.

Table 10: Speed, agility, and coordination development program during the specific preparation phase

No.	Training content	Sets	Repetitions	Intensity	Rest interval (minute)
1	20-m sprint	4	1	High	1-2'
2	Rope skipping	2	80	High	1-2'
3	Lateral movement drills	3	2	High	1-2'
4	Defensive digging drills	5	15	High	1-2'
5	Moving set drills	4	15	High	1-2'

Strength training during the specific preparation phase: During the explosive strength phase, the program included: three upper-body exercises, three lower-body exercises, and two trunk exercises.

Training intensity ranged from 85–100% of 1RM (one-repetition maximum) in the maximum strength phase. The number of sets ranged from 3–5 sets, with a total training volume reaching 15–20 repetitions.

Table 11: Strength development program during the specific preparation phase

No.	Training content	Giai đoạn huấn luyện		Rest Interval
		Weeks 6- 7	Weeks 8-9	
1	Barbell squat	<u>70/3 75/2 80/1</u> 20 15 10	<u>80/3 85/2 90/1</u> 15 10 8	30 seconds
2	Barbell jump squat	<u>70/3 75/2 80/1</u> 20 15 10	<u>80/3 85/2 90/1</u> 15 10 8	30 seconds
3	Supine leg press	<u>70/3 75/2 80/1</u> 20 15 10	<u>80/3 85/2 90/1</u> 15 10 8	30 seconds
4	Hurdle jumps	1m 10 reps/ 3 sets	1m 10 reps/ 5 sets	30 seconds
5	Two-leg box jumps (60cm)	50cm	60cm	30 seconds
6	Hurdle jumps combined with spiking	10 reps/ 3 sets	10 reps/ 5 sets	1-2 minutes
7	Abdominal exercises 30 second (repetitions)	30s/3 sets	40s/3 sets	30 seconds
8	Back exercises 30 second (repetitions)	30s/3 sets	40s/3 sets	30 seconds

Endurance training during the specific preparation phase: The training duration ranged from 15–20 minutes per session. General endurance exercises were conducted on Saturdays. Sport-specific endurance exercises were implemented on Mondays and Wednesdays.

Table 12: Endurance development program during the specific preparation phase

No.	Training content	Sets	Repetitions	Intensity	Rest interval (minute)
General endurance					
1	2,500 m run	1	1	Medium-low	>5
Sport-specific endurance					
2	Continuous spiking drills	4	15 reps	High	5
3	Continuous defensive drills	5	10 reps	High	5
4	Continuous blocking drills	5	15 reps	High	5

Evaluation of the specialized physical fitness of the Sanest Khanh Hoa young men's volleyball team after the cycle 2 training plan

Table 13: Development of specialized physical fitness of the Sanest Khanh Hoa young men's volleyball team after training cycle 2

No.	Test	Indicator						
					Cv	W%	t	p
1	Run and jump to hit the ball repeatedly (repetitions)	first time	5.88	0.801	15.64	34.11	13.21	<0.05
		third time	8.29	0.54	6.53			
2	9–3–6–3–9 shuttle run test (s)	first time	8.81	0.23	2.61	8.55	14.66	<0.05
		third time	8.09	0.203	2.51			
3	Approach vertical jump (cm)	first time	320.75	5.56	1.73	4.79	13.48	<0.05
		third time	336.5	6.91	2.05			
4	Block jump height (cm)	first time	311.83	7.71	2.47	6.09	21.36	<0.05
		third time	331.42	8.18	2.47			

The comparison results in Table 13 show that after Cycle 2 (after one year of training), all test indicators demonstrated improvement. Specifically

- **Run and jump to hit the ball repeatedly test (repetitions):** There was a significant improvement after one year of training. The mean value increased from 5.88 repetitions to 8.29 repetitions, with a growth rate of $W\% = 34.11\%$ and $t_{\text{calculated}} > t_{\text{table}}$ ($t_{\text{calculated}} = 13.21$). The growth rate is statistically significant at the probability level $p < 0.05$.
- **9–3–6–3–9 shuttle run test (seconds):** The initial mean value was 8.81 seconds, which decreased to 8.09 seconds after one year of training. The growth rate after one year was $W\% = 8.55\%$. The difference between the two mean values is statistically significant at $p < 0.05$, with $t_{\text{calculated}} > t_{\text{table}}$ ($t_{\text{calculated}} = 14.66$; $t_{\text{table}} = 2.179$).
- **Approach vertical jump (cm):** After one year of training, performance improved markedly. The mean value increased from 320.75 cm to 336.5 cm. The growth rate was $W\% = 4.79\%$, and this improvement is statistically significant at $p < 0.05$, with $t_{\text{calculated}} > t_{\text{table}}$ ($t_{\text{calculated}} = 13.48$; $t_{\text{table}} = 2.179$).
- **Block jump height (cm):** After one year of training, improvement was observed, with the mean value increasing from 311.83 cm to 331.42 cm. The average growth rate was $W\% = 6.09\%$. This improvement is statistically significant at $p < 0.05$, with $t_{\text{calculated}} > t_{\text{table}}$ ($t_{\text{calculated}} = 21.36$; $t_{\text{table}} = 2.179$).

Discussion

Based on the synthesized findings of scholars such as (Harre.D. 1989); (Lam Quang Thanh. 2006); (Bui Trong

Toai. 2006), the guidelines for developing training plans mainly focus on research content and tend to be general rather than specific. They primarily provide an overview of cycles, periods, and phases, without thoroughly presenting a comprehensive and harmonious training plan that integrates all training components in a balanced manner.

In this study, a one-year training plan was developed and structured according to the competition phases throughout the year. Periodic evaluations were scheduled for each phase prior to competitions (including general and sport-specific physical fitness tests). The training load was quantitatively distributed in a rational manner for each training phase, ensuring appropriate training stimuli for the athletes. The program applied suitable intensity levels, implementation measures, and training methods to effectively accomplish each type of exercise, each training session, each training cycle, and the overall annual training plan. These systematic applications produced promising results, specifically as follows:

Regarding specialized physical fitness: After two training cycles, the results showed clear improvements as reflected in the evaluation tests. Through analyzing the growth rates and individual sport-specific performance indicators, we observed that most athletes demonstrated progressive improvement across each phase. Each athlete also exhibited particularly outstanding growth in certain specific tests. This indicates that the Sanest Khanh Hoa young men's volleyball players tend to develop physical qualities in alignment with their specialized playing positions as defined by the team's tactical orientation. The highest growth rate was recorded in the "Run and jump to hit the ball repeatedly" test with $W\% = 34.11\%$. The "9–3–6–3–9 shuttle run" test showed a growth rate of $W\% = 8.55\%$. The "Block jump" test achieved a growth rate of $W\% = 6.09\%$, while the lowest growth rate was observed in the "Approach vertical jump" test with $W\% = 4.79\%$. These results demonstrate that after

one year of training, the athletes of the Sanest Khanh Hoa young men's volleyball team were able to effectively integrate the developed physical qualities into technical coordination, thereby enhancing their overall performance efficiency.

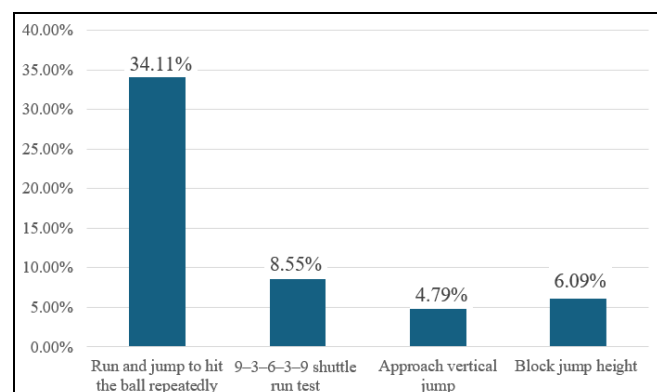


Chart 2: Comparison of the growth rates of specialized physical fitness indicators of the Sanest Khanh Hoa Young Men's volleyball players after one year of training

In addition to the effectiveness of the physical development program, the training plan of the Sanest Khanh Hoa young men's volleyball team also had a positive impact on competitive performance, as the team achieved its stated objective of reaching the A1 final round. Competitive results improved progressively through each tournament, including the National A1 Volleyball Championship (held in Dak Lak) and the National Youth Championship (held in Bac Kan). The achievements obtained during the year demonstrate that the training plan implemented by the coaching staff of the Sanest Khanh Hoa young men's volleyball team was well-oriented and highly effective.

Conclusion

Based on the research results addressing the objectives of the study, the following conclusions can be drawn: Four tests were identified to evaluate the specialized physical fitness of the Sanest Khanh Hoa young men's volleyball team, including: Continuous approach jump spike (repetitions), 9-3-6-3-9 shuttle run (s), Approach vertical jump (cm), and Block jump (cm). In addition, 35 specialized physical development exercises were selected, consisting of: 10 flexibility exercises, 6 speed-agility-coordination exercises, 14 strength exercises, and 5 endurance exercises. After one year of implementing the training plan and applying these exercises in practice, the specialized physical fitness level of the Sanest Khanh Hoa young men's volleyball players showed clear improvement. The lowest growth rate was observed in the approach vertical jump test ($W\% = 4.79\%$), while the highest growth rate was recorded in the continuous approach jump spike test ($W\% = 25.11\%$). These growth rates are statistically significant at the probability level $p < 0.05$, with $t_{\text{calculated}} > t_{\text{table}}$.

The research findings serve as a valuable reference for training practice, particularly for the Sanest Khanh Hoa young men's volleyball team, and more broadly for youth volleyball teams in Vietnam.

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