International Journal of Physiology, Sports and Physical Education
www.physicaleducationjournal.net
Online ISSN: 2664-7729, Print ISSN: 2664-7710
Received: 29-08-2021, Accepted: 13-09-2021, Published: 29-09-2021
Volume 3, Issue 1, 2021, Page No. 32-38

Research exercise for developing jumping endurance for male students specializing in volleyball at Hanoi University of physical education and sports

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DOI: https://doi.org/10.33545/26647710.2021.v3.i1a.26

Abstract
Through the use of methods: document analysis and synthesis method, discussion interview method, pedagogical observation method, pedagogical experimental method, mathematical and statistical method, we have selected 05 tests and built up standards to evaluate jumping endurance as well as identified 17 exercises to develop jumping endurance for male students in Volleyball major at Hanoi University of Physical Education and Sports.

Keywords: exercise, development, jumping endurance, students, volleyball major

Introduction
Along with the training in theoretical knowledge, the issue of technical equipment, tactics; and especially physical strength for students majoring in Volleyball at Hanoi University of Physical Education and Sports is always focused.
However, by observing the practice of teaching and coaching Volleyball, we found that the professional fitness of the students is still limited, especially the jumping endurance. Although coaches and instructors have used methods and exercises to develop jumping endurance for students, the exercises are conducted in a synchronous, scientific and untested manner. so the efficiency achieved is still not high. Faced with that fact, we decided to study the topic "Research on exercises to develop jumping endurance for male students majoring in Volleyball at Hanoi University of Physical Education and Sports.

Research Methods
In the process of researching the topic, the following methods were used: Method of document analysis and synthesis; Methods of interview and discussion; Methods of pedagogical observation; Methods of pedagogical inspection; Experimental method of pedagogy; Statistical Mathematical Methods.
Research participants: 56 male students majoring in volleyball Ha Noi University of Physical Education and Sports were divided into 2 groups; experimental group (28 male students) and control group (28 male students).
Survey subjects: 20 teachers and coaches in Ha Noi choose exercises and tests for the study
Experimental location: Ha Noi University of Physical Education and Sports
Experimental time: Twelve months, from September 2017 to September 2018

Research Results and Discussion
Choosing exercises to develop jumping endurance for male students majoring in volleyball, Hanoi University of Physical Education and Sports.
Principles of exercise selection
To ensure objectivity in the research process and to select exercises suitable for the research object. Through reference to professional documents, through theoretical and practical bases, we develop principles for choosing exercises as follows:
Principle 1: The selected exercises must be oriented to develop physical fitness for male students majoring in volleyball, Hanoi University of Physical Education and Sports.

Principle 2: The exercises must be suitable for the training object (in terms of psychophysiology, level, training conditions).

Principle 3: The selected exercises must ensure reliability and inform the research subjects necessary.

Principle 4: The exercises must be diverse, creating excitement for the practitioner.
Principle 5: The exercises must be approachable with the trend of using training methods and methods in modern volleyball training.

Select exercises
Based on the principle of exercise selection, to conduct a selection of exercises to develop jumping endurance for male students majoring in Volleyball at Hanoi University of Physical Education and Sports we refer to professional documents on teaching and learning Volleyball teaching and training and direct interviews with 20 lecturers, coaches... about exercises using jumping endurance training for research subjects. The topic has synthesized 25 exercises, including:

- **Exercise 1:** Block the ball single at positions 3 and 4 (2).
- **Exercise 2:** Beat the ball continuously at positions 4 (3 - 2), after touching the ground, quickly retreat to the attack line.
- **Exercise 3:** Sequentially hit the ball at positions 3-4, each

defender at positions 6 and 1.

- **Exercise 4:** Smash the ball at position 4 (2) with a collective block arrangement; The defenders of the back row are in position 1 (5) and the defenders are left behind the barricades.
- **Exercise 5:** Several exercises with ante dumbbells (3 kg).
- **Exercise 6:** Passing and throwing stuffed balls (0.5 - 1kg).
- **Exercise 7:** Stand in place or jump and hit the ball hard on the field.
- **Exercise 8:** Perform jumping movements when carrying weight.
- **Exercise 9:** Carry weights on your shoulders, stand up and sit down with a weight equal to 50-70% of your body weight.
- **Exercise 10:** Carry a weight equal to 50% of your body weight and perform a jump, switch legs in place, or move forward.
- **Exercise 11:** Jumping in the sandpit continuously for 30 seconds
- **Exercise 12:** Perform a simulation of hitting the ball with a rubber band
- **Exercise 13:** Run the shuttle and touch the attack line and the boundary line.
- **Exercise 14:** Hit the ball in the direction of momentum at position 4 (3, 2) with the intensity of performing the exercise 5 times in 20 seconds.
- **Exercise 15:** Defensive activities in pairs (1 defense, 1 hit)
- **Exercise 16:** Lifting 20 kg weights on your shoulders, jumping for 1 minute.
- **Exercise 17:** Jump on a podium 80-100cm high with a time of 1 minute.
- **Exercise 18:** Block the ball continuously at positions 2, 3, 4 with a duration of 2 minutes.
- **Exercise 19:** Movement games
- **Exercise 20:** Play continuously for 6-9 rounds
- **Exercise 21:** From a squatting position, aside combined with a side slide.
- **Exercise 22:** Standing in a dynamic position, lunge forward to touch the ground with your hands - chest - abdomen.
- **Exercise 23:** Leaning to the side to perform over-the-shoulder movements; lunge out to perform a front flip.
- **Exercise 24:** Jumping with one foot alternately from one foot to the other combined with active jumping of the feet.
- **Exercise 25:** Simulate the movement of blocking, hitting the ball combined with turning in the air 90 degrees, 180 degrees.

The exercises are listed based on a meta-analysis of documents from experts, lecturers, and coaches, only at the reference level.

To be able to use in teaching - training for students of Hanoi University of Physical Education and Sports it is necessary to go through expert interviews. Therefore, after synthesizing the exercises, the topic conducted interviews (by questionnaires) with experts, coaches; and lecturers teaching Volleyball. The content of the interview is to determine the priority of the exercises *at 3 levels:*

Priority 1: 3 points (Very important exercise).
Priority 2: 2 points (Important exercise).
Priority 3: 1 point (Exercise is not important).

The topic is based on interview results to find and select specific exercises to develop jumping endurance for research subjects. The results are presented in Table 1.

Table 1: Interview results on a selection of exercises to develop jumping endurance for male students majoring in Volleyball at Hanoi University of Physical Education and Sports (n=20)

Exercise	Priority 1		Priority 2		Priority 3		Total score	%
	n	Score	n	score	n	score		
Exercise 1	20	60	0	0	0	0	60	100
Exercise 2	12	36	5	10	3	3	49	81.67
Exercise 3	5	15	6	12	9	9	36	60.0
Exercise 4	13	39	7	14	1	1	53	88.33
Exercise 5	4	12	6	12	10	10	34	56.67
Exercise 6	2	6	8	16	10	10	32	53.33
Exercise 7	10	30	9	18	1	1	49	81.67
Exercise 8	11	33	8	16	1	1	50	83.33
Exercise 9	15	45	5	10	0	0	55	91.67
Exercis 10	13	39	7	14	1	1	53	88.33
Exercise 11	12	36	5	10	3	3	49	81.67
Exercise 12	13	39	6	12	1	1	52	86.67
Exercise 13	3	9	5	15	12	12	36	60.0
Exercise 14	9	27	11	22	0	0	49	81.67
Exercise 15	18	54	1	2	1	1	57	95.0
Exercise 16	19	57	1	2	0	0	59	98.33
Exercise 17	20	60	0	0	0	0	60	100
Exercise 18	15	45	5	10	0	0	55	91.67
Exercise 19	6	18	5	10	9	9	37	61.67
Exercise 20	16	48	2	4	2	2	54	90.0
Exercise 21	5	15	5	10	10	10	35	58.33
Exercise 22	5	15	4	8	11	11	37	61.67
Exercise 23	3	9	6	12	11	11	32	53.33
Exercise 24	10	30	10	20	0	0	50	83.33
Exercise 25	13	39	4	8	3	3	49	81.67

Through the interview results in Table 1, the topic has selected 17 exercises with a priority of 80% or more to develop jumping endurance for male students majoring in Volleyball at the Hanoi University of Physical Education & Sports, that is Exercise 1, exercise 2, exercise 4, exercise 7, exercise 8, exercise 9, exercise 10, exercise 11, exercise 12, exercise 14, exercise 15, exercise 16, exercise 17, exercise 18, exercise 20, exercise 24, exercise 25.

Applying and evaluating the effectiveness of exercises to develop jumping endurance for male students majoring in volleyball at Hanoi University of Physical Education and Sports.

Selecting the test to assess jumping endurance for students majoring in volleyball, Hanoi University of Physical Education and Sports.

Based on reference to general and specialized physical training documents, documents of domestic and foreign expert, works of the authors who have done previous research on teaching and coaching volleyball. The topic has collected

10 tests to evaluate jumping endurance for volleyball athletes. To ensure objectivity and suitability with the research object is a male student specialized in volleyball, Hanoi University of Physical Education and Sports. We conduct expert interviews to select Tests. The results of the interviews are presented in Table 2.

Table 2: Results of interview selection Test to assess professional endurance for students majoring in volleyball at Hanoi University of Physical Education and Sports (n=20)

No	Test	Agree		Disagree	
		n	%	n	%
1	Run 9 - 3 - 6 - 3 - 9(s)	1	5	19	95
2	Turn on with momentum (cm)	2	10	18	90
3	Run the pine tree(s)	20	100	0	0
4	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	15	75	5	25
5	High bounce in place (cm)	12	60	8	40
6	Jump high with a momentum of 1 foot (cm)	13	65	7	35
7	Two people jump to block the ball continuously for 1 minute (number of times).	17	85	3	15
8	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	18	90	2	10
9	2 minutes jump rope (times)	17	85	3	15
10	Composite test (times)	8	40	12	60

From the results in Table 2. We selected 5 tests to assess jumping endurance for male students majoring in volleyball K48, Hanoi University of Physical Education and Sports, with 75% or more favorable opinions, including:

Test 1: Run the pine tree(s)

Test 2: Jumping and hitting the ball at position 3 continuously for 1 minute (times)

Test 3: Two people jump to block the ball continuously for 1 minute (number of times).

Test 4: Move to the sides, jump and touch the ball with both hands for 1 minute (number of times)

Test 5: Jump rope 2 minutes (times)

After selecting the tests to evaluate jumping endurance for research subjects by interview method, the topic continues to determine their reliability by the repeated testing method. Reliability is determined by the correlation coefficient between 2 tests of 5 tests (the first time is separated from the second time within 1 week, the test conditions are the same). The results are in Table 3.

Table 3: Correlation between two tests of jumping endurance tests of students majoring in volleyball at Hanoi University of Physical Education and Sports (n=12)

No	Test content	Test results		r
		1st ($\bar{x} \pm \delta$)	2nd ($\bar{x} \pm \delta$)	
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	21,7±1,40	21,81±1,32	0,85
2	Two people jump the ball continuously on the net for 1 minute (times)	43,8±2,06	43,6±2,05	0,86
3	Run the pine tree(s)	24,70±1,02	24,71±1,06	0,90
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	12,5±1,21	12,66±1,26	0,88
5	2 minutes jump rope (times)	214±12,1	214,2±12,12	0,87

Table 3 shows that: in all 5 selected evaluation tests, the test results have a strong correlation between the 2 tests with $r > 0.80$ at the probability threshold $P < 0.05$. So they ensure reliability and allow use for male students majoring in volleyball at Hanoi University of Physical Education and Sports.

Developing standards for assessing jumping endurance for volleyball-intensive students at Hanoi University of Physical Education and Sports.

* Classification of standards to evaluate jumping endurance

Through the results of the pedagogical examination, the topic classified each indicator of jumping endurance into five levels according to the rule of 2 sigmas: good, fair, average, weak, and poor as follows:

- **Good:** > + 2δ
- **Fair:** From +1δ to +2δ
- **Average:** From -1δ to +1δ
- **Weak:** From - 1δ to - 2δ
- **Poor:** < - 2δ

For time-based indices, the classification is reversed, where < - 2 is good and > + 2 σ is poor. Calculation results are presented in a standard classification table for evaluating jumping endurance for male students majoring in Volleyball, Hanoi University of Physical Education and Sports, each test standard is shown in Table 4.

Table 4: Classification of standards for assessing jumping endurance for male students majoring in Volleyball, Hanoi University of Physical Education and Sports.

No	Test	Classify				
		Poor	**Weak**	**Average**	**Fair**	**Good**
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	< 18	18–20	20 – 23	23- 25	≥ 25
2	Two people jump the ball continuously on the net for 1 minute (times)	≤ 40	40 – 42	42 – 45	45- 47	≥ 47
3	Run the pine tree(s)	≥ 28.7	28.69 – 27.7	27.69 – 25.71	25.7 – 24.71	≤ 24.7
4	Move to the sides, jump, and touch the ball with both hands (for 60 seconds counting the number of times)	≤ 10	10 – 11	11 – 13	13- 15	≥ 15
5	2 minutes jump rope (times)	≤ 190	191 - 202	203 - 225	226 - 237	≥ 238

The results obtained through the above tables are very convenient to use in assessing and classifying the level of each content of the jumping endurance test, and at the same time serve for comparison and reference in training practice. Training and evaluating jumping endurance for research subjects.

- Determining the benchmark for assessing the jumping endurance of volleyball-intensive students at Hanoi University of Physical Education and Sports.

Classification of evaluation criteria allows to evaluate each specific criterion, but each indicator has a different unit of measurement, so for the general assessment of professional endurance, it is not guaranteed to be accurate. Therefore, the topic uses the formula for calculating points on the C scale to reduce all the different measurement units to points. The calculation results are presented in Table 5.

Table 5: Scoreboard for assessing jumping endurance for male students majoring in volleyball, Hanoi University of Physical Education and Sports.

TT	Test	Score									
		10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	26	25	24	23	22	21	20	19	18	17
2	Two people jump the ball continuously on the net for 1 minute (times)	48	47	46	45	44	43	42	41	40	39
3	Run the pine tree(s)	24,2	24,7	25,2	25,7	26,2	26,7	27,2	27,7	28,2	28,7
4	Move to the sides, jump, and touch the ball with both hands (60 seconds counting the number of times)	16	15	14	13	12	11	10	9	8	7
5	2 minutes jump rope (times)	244	238	232	226	220	214	208	202	196	190

After all the results of the criteria have been attributed to points, it is necessary to develop a general standard to evaluate jumping endurance. The topic uses 5 tests on a 10-point scale to evaluate jumping endurance, which corresponds to the maximum score of 50 points, compared with the results obtained in Table 5, the topic draws the results of grading points. synthesize assessment of jumping endurance for research subjects as shown in Table 6.

Table 6: Evaluation criteria for jumping endurance for men Volleyball students at Hanoi University of Physical Education and Sports.

No	Classification	Total score (Maximum total score = 50)
1	Good	≥ 45
2	Fair	40 - 44
3	Everage	25 - 39
4	Weak	15 - 24
5	Poor	< 15

Experimental results

Beforeexperimenting, we conducted an initial test to compare the two control and experimental groups. The results are presented in Table 7.

Table 7: Initial results of 2 groups of control and experiment

No	Test	Control group (n = 28) $\bar{x} \pm \delta$	Experimental group (n= 28) $\bar{x} \pm \delta$	t	p
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	21,7±1,40	21,81±1,32	0,82	>0,05
2	Two people jump the ball continuously on the net for 1 minute (times)	43,8±2,06	43,5±2,05	0,62	>0,05
3	Run the pine tree(s)	24,91±1,13	24,9±1,32	0,78	>0,05
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	12,5±1,21	12,76±1,26	0,56	>0,05
5	2 minutes jump rope (times)	213±13,6	214,0±12,84	1,04	>0,05

The results in Table 7 show that: The initial test results of the evaluation tests all show t.count < t. table at the probability threshold p> 0.05. This shows that the performance of the 2 groups does not show a statistically significant difference. In other words, before the experiment, the jumping endurance of the two groups was similar. After 3 months of practice, we conducted tests on both groups with selected evaluation tests, to determine the level of the 2 groups after a period of experimentation and to consider adjusting the experimental plan. Appropriate as well as evaluate the impact level of the exercises selected in the experimental process. The results are presented in Table 8.

Table 8: Test results after 3 months of practice of 2 groups

No	Test	Control group (n = 28) $\bar{x} \pm \delta$	Experimental group (n= 28) $\bar{x} \pm \delta$	t	p
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	22,01±1,41	23,10±1,34	1,82	>0,05
2	Two people jump the ball continuously on the net for 1 minute (times)	44,0±2,09	45,02±2,06	1,62	>0,05
3	Run the pine tree(s)	24,90±1,13	24,82±1,34	1,78	>0,05
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	13,2±1,20	14,76±1,26	1,56	>0,05
5	2 minutes jump rope (times)	214±13,6	216,0±12,84	2,14	>0,05

From the results in Table 8, it can be seen that after 3 months of the experiment, the achievement of the experimental group has not been significantly different with t.count < t. table at the probability threshold p> 0.05, or in other words, after 3 months of practice. The effect of the exercises on the experimental subjects is not large. To have an overview of the research results of the topic, we tested 2 groups after 12 months of the experiment. The results are presented in Table 9.

Table 9: Test results after 12 months of the experiment of 2 groups

TT	Test	Control group (n= 28) $\bar{x} \pm \delta$	Experimental group (n= 28) $\bar{x} \pm \delta$	t	p
1	Jump, bounce and bounce the ball at position 3 continuously for 1 minute (times)	23,10±1,34	30,67±1,46	3,32	<0,05
2	Two people jump the ball continuously on the net for 1 minute (times)	45,02±2,06	48,06±10,18	3,26	<0,05
3	Run the pine tree(s)	24,82±1,34	23,78±1,21	3,18	<0,05
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	14,76±1,26	18,86±1,32	3,28	<0,05
5	2 minutes jump rope (times)	216,0±12,84	226,5±12,87	3,43	<0,05

Table 9 shows that: The test results after 12 months of experiment with 5 tests to evaluate jumping endurance for the research subjects have t > tab at the probability threshold P < 0.05. This shows that after the experiment, the performance of the experimental group improved more than the control group. In other words, the difference between the experimental and control groups was statistically significant. To confirm more clearly the effectiveness of the selected exercises for the research subjects, we evaluated the growth rate of the 2 groups after 12 months of experimentation. The results are presented in Table 10; Table 11 and chart 1.

Table 10: The Growth rate of experimental group after 12 months of experiment

No	Tests check	Before experimental $\bar{X} \pm \delta$	After experiment $\bar{X} \pm \delta$	W%
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	21,81±1,32	30,67±1,46	33.77
2	Two people jump the ball continuously on the net for 1 minute (times)	43,5±2,05	48,06±10,18	9.96
3	Run the pine tree(s)	24,9±1,32	23,78±1,21	-4.60
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	12,76±1,26	18,86±1,32	38.58
5	2 minutes jump rope (times)	214,0±12,84	226,5±12,87	5.68

Table 11: The Growth rate of the control group after 12 months of experiment

No	Tests check	Before experimental $\bar{X} \pm \delta$	After experimental $\bar{X} \pm \delta$	W%
1	Jump, bounce, and bounce the ball at position 3 continuously for 1 minute (times)	21,7±1,40	23,10±1,34	6.25
2	Two people jump the ball continuously on the net for 1 minute (times)	43,8±2,06	45,02±2,06	2.75
3	Run the pine tree(s)	24,91±1,13	24,82±1,34	-0.36
4	Move to the sides, jump, and touch the ball with both hands for 1 minute (number of times)	12,5±1,21	14,76±1,26	16.58
5	2 minutes jump rope (times)	213±13,6	216,0±12,84	1.40

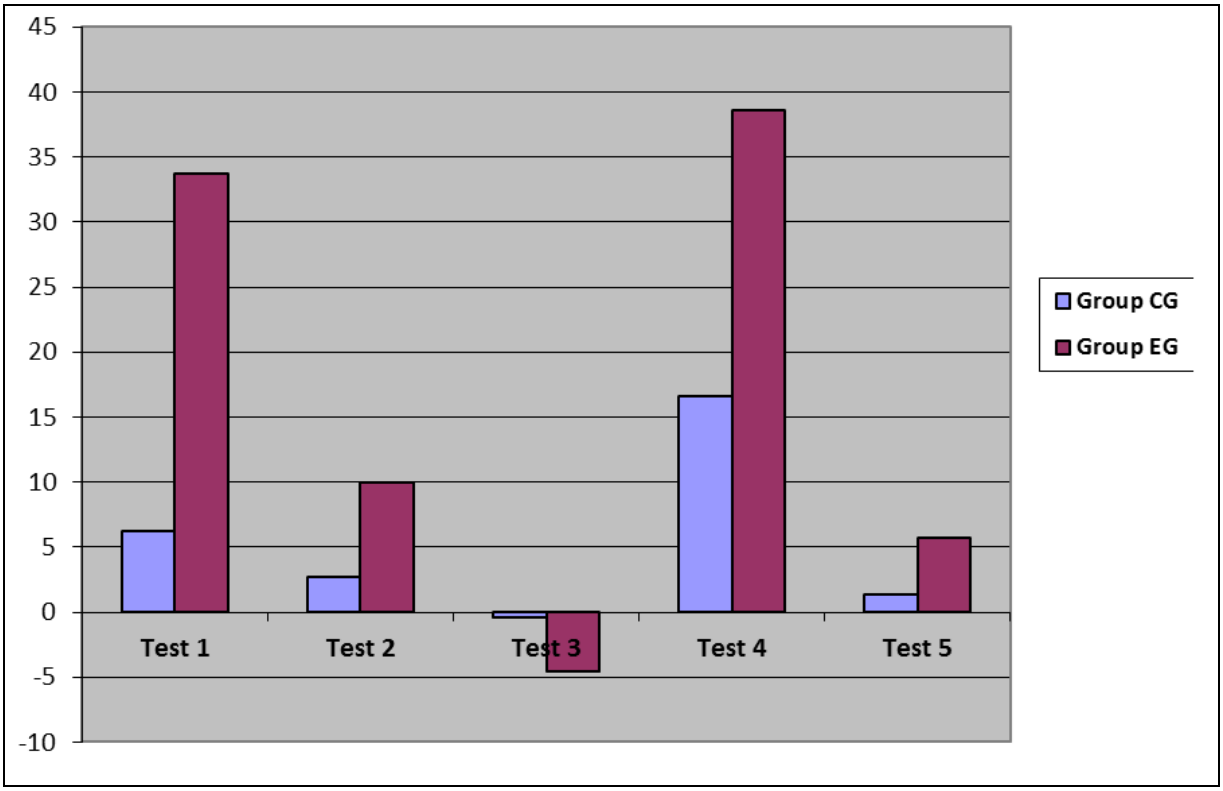

Fig 1: Comparison of the growth rate of the two groups after the experiment

Through the results of table 10, table 11, and chart 1, it shows that:

After 12 months of practice, the performance in the jumping endurance tests of both groups had an increase in all 5 evaluation tests, but the growth in the evaluation tests of the experimental group was much better than that of the experimental group. with the control group. Thereby, it can be confirmed that the exercises that we choose to apply to the experimental group are better than the control group.

To confirm the effectiveness of the system of specialized exercises that have been selected for application in training to develop jumping endurance for research subjects, after the end of the experimental process, the topic compares the results. The results of professional fitness ratings between the control and experimental groups. The results are presented in Table 12.

Table 12: Comparison of jumping endurance ratings of 2 groups experimental and control after 12 months of experiment

Classification	Research target group		Total
	Experimental group (n=28)	Control group (n = 28)	
Good	19	10	29
Fair	7	12	19
Everage	2	6	8
Total	28	28	56
Compare	$\chi^2_{caculated} = 7.071 > \chi^2_{0.05} = 5.991$ with $P < 0.05$		

From the results obtained in Table 12, it shows that, when comparing the test results to assess the jumping endurance of the research subjects between the control group and the experimental group, there is a significant difference with χ 2 crystals = 7,071 > χ 2 tables = 5,991 with $p < 0.05$. That once again confirms the effectiveness of the exercise that has been selected as a training application to develop jumping endurance for male students majoring in volleyball at Hanoi University of Physical Education & Sports.

From the above results, we can confirm that the exercises that the research topic has selected and applied in training have affected developing jumping endurance for male students majoring in volleyball at Hanoi University of Physical Education & Sports ensures reliability at the necessary statistical probability threshold.

Conclusion

From the above research results, the study draws the following conclusions

1. The current situation of using exercises to develop jumping endurance for research subjects has not been focused, the exercises are not rich and diverse. The topic has selected 5 typical tests and has developed standards, a summary scoreboard to evaluate jumping endurance for research subjects, ensuring reliability. Through testing and assessing the actual situation of jumping endurance of male students majoring in volleyball at Hanoi University of Physical Education and Sports, it is still at an average level.
2. During the research process, the topic has selected 17 exercises to develop jumping endurance for students majoring in Volleyball at Hanoi University of Physical Education and Sports, including:

- **Exercise 1:** Block the ball single at positions 3 and 4 (2).
- **Exercise 2:** Beat the ball continuously at positions 4 (3 - 2), after touching the ground, quickly retreat to the attack

line.

- **Exercise 3:** Hit the ball at position 4 (2) with a collective block arrangement; The defenders of the back row are in position 1 (5) and the defenders are left behind the barricades.
- **Exercise 4:** Stand in place or jump and hit the ball hard on the field.
- **Exercise 5:** Perform jumping movements when carrying weight.
- **Exercise 6:** Carrying weights on your shoulders, stand up, and sit down with a weight equal to 50-70% of your body weight.
- **Exercise 7:** Carry a weight equal to 50% of your body weight and perform a jump, switch legs in place, or move forward.
- **Exercise 8:** Jumping in the sandpit continuously for 30 seconds
- **Exercise 9:** Perform a simulation of hitting the ball with a rubber band
- **Exercise 10:** Hit the ball in the direction of gaining momentum at position 4 (3, 2) with the intensity of performing the exercise 5 times in 20 seconds.
- **Exercise 11:** Defensive activities in pairs (1 defense, 1 hit)
- **Exercise 12:** Lifting 20 kg weights on your shoulders, jumping for 1 minute.
- **Exercise 13:** Jump on a podium 80-100cm high with a time of 1 minute.
- **Exercise 14:** Block the ball continuously at positions 2, 3, 4 with a duration of 2 minutes.
- **Exercise 15:** Play continuously for 6-9 rounds
- **Exercise 16:** Jumping with one foot alternately from one foot to the other combined with active jumping of the feet.
- **Exercise 17:** Simulate the movement of blocking, hitting the ball combined with turning in the air 90°, 180°.

For 12 months of experimentation, the topic has identified a clear effect of the selected exercises with the application of training in developing jumping endurance, contributing to improving the professional fitness of the research subjects (with t. calculated > t. table at probability threshold $p < 0.05$).

References

1. Dinh Lam, Nguyen Binh, Volleyball Coach, Hanoi Sports Publishing House, 1994.
2. Dang Hung Manh. Volleyball textbook, Hanoi Sports Publishing House, 2010.
3. El-Sayed SL, Mohammed MS, Abdullah HF. Impact of Pilates exercises on the muscular ability and components of jumping to volleyball players. Word Journal of Sport Sciences,2010:3:712-718
4. Gallardo-Fuentes F, Gallardo-Fuentes J, Ramírez-Campillo R, Balsalobre-Fernández C, Martínez C, Caniuqueo A, Izquierdo M. Intersession and intrasession reliability and validity of the My Jump app for measuring different jump actions in trained male and female athletes. Journal of strength and conditioning research,2016:30(7):2049-2056.
5. Gianpiero Greco, Giuseppe Messina, Arianna Angiulli, Antonino Patti, Angelo Iovane, Francesco Fischetti A preliminary comparative study on the effects of Pilates training on physical fitness of young female volleyball players, Acta Medica Mediterranea,2019:2(93):783
6. Gouttebarge V, Zwerver J, Verhagen E. Preventing musculoskeletal injuries among recreational adult volleyball players: Design of a randomised prospective controlled trial. BMC Musculoskelet. Disord,2017:18:333.
7. Le Van Lam - Pham Xuan Thanh. "Measurement of Physical Education and Sports" ,Hanoi Sports Publishing House, 2007.
8. Nebojša Trajkovi´c, Goran Sporiš, Tomislav Kristi˘cevi´c and Špela Bogataj Effects of Small-Sided Recreational Volleyball on Health Markers and Physical Fitness in Middle-Aged Men, International Journal of Environmental Research and Public Health, 2020.
9. Phan Hong Minh - Nguyen Thanh Lam - Tran Duc Phan. Volleyball training methods, Science and Technology Information - Volleyball topic, Institute of Sports Science, Hanoi Publishing House, 1997.
10. Trajkovi´c N, Madi´c D, Andraši´c S, Radanovi´c D. Effects of recreational volleyball on health markers in middle-aged men. In Proceedings of the 14th International Scientific Conference of Sport Kinetics 2018, Pore˘c, Croatia, 2018, 66-70.
11. Tran Duc Phan. Research and apply a system of exercises to develop flexible capacity for female volleyball players aged years old, Doctoral thesis in education, Institute of Sports Science, 2001, 14-16.