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## Determination of physical evaluation indexes of 10-11-year-old male table tennis players in Vietnam

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### Abstract

Physical training for children's table tennis players is also an important part of table tennis training. With the main goal of improving the training level and competition results of children's table tennis players, adopting scientific and effective training principles and methods will have a positive impact on the overall level of Vietnamese table tennis. Therefore, by constructing the evaluation system standard for physical training of children's athletes, it can provide effective reference and theoretical basis for experts and coaches of Vietnamese table tennis., measurement and evaluation methods, and mathematical statistics methods were used to study the evaluation indicators of physical fitness level of Vietnamese male table tennis players in the age group of 10-11.

**Keywords:** Men, table tennis, physical fitness, evaluation index

### 1. Introduction

Table tennis is a popular sport with a long-term development prospect. The sports characteristics of this sport are very suitable for the physical characteristics of Vietnamese people. At the same time, it is also one of the sports that Vietnam focuses on developing. For the Vietnamese sports field, it is very difficult to train children to become sports talents.

We lack scientific, systematic and targeted guiding ideas and practical operations for athlete training and evaluation standards. There are still many deficiencies in the current status of table tennis training in Vietnam, such as the lack of standardization in the training process and the failure of the evaluation system for athlete training to reflect scientific, comprehensive and feasible characteristics.

According to literature analysis, most of the research on physical fitness evaluation of table tennis players focuses on the adolescent age stage, while ignoring the research on children. Physical fitness training of children's table tennis players is also an important part of table tennis training. Taking improving the training level and competition results of children's table tennis players as the main goal, adopting scientific and effective training principles and methods will greatly promote the improvement of the overall level of Vietnamese table tennis. Therefore, by constructing the standards for the physical fitness training evaluation system of children's athletes, it can provide effective reference and theoretical basis for experts and coaches of Vietnamese table tennis.

### 2. Results and Discussions

#### 2.1. Determination of physical fitness evaluation indicators for Vietnamese male table tennis players aged 10-11

This paper uses the above evaluation indicators to send questionnaires to 45 famous experts and coaches who are engaged in table tennis teaching and training at the provincial and municipal levels in Vietnam, as well as a Chinese expert who is currently the head coach of the male table tennis players aged 10-11 in the Danang team of Vietnam. A total of 46 questionnaires were sent out, of which 42 were valid. The results are shown in the following table:

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**Table 1:** Questionnaire survey results on physical fitness evaluation indicators of male table tennis players aged 10-11 (n=42)

Evaluation indicators	Usage					
	Often		Generally,		Not used	
	n	%	n	%	n	%
<b>Sports quality index</b>						
60m standing start (seconds)	36	85.71	4	9.52	2	4.77
1 minute holding dumbbells and swinging arms forward and backward on both sides (times)	37	88.09	3	7.14	2	4.77
1 minute advantage hand-held dumbbell swing forward and backward (times)	38	90.48	4	9.52	0	0
1minute single swing skipping (times)	35	83.33	5	11.9	2	4.77
Standing long jump (cm)	33	78.57	6	14.28	3	7.14
Badminton throw (meters)	32	76.19	4	9.52	6	14.28
1 minute sit-ups (times)	34	80.95	3	7.14	5	11.9
Move 3 meters and pick up 21 balls (seconds)	39	92.85	3	7.14	0	0
1 minute squats (times)	32	76.19	4	9.52	6	14.28
30m standing start (seconds)	37	88.09	5	11.9	0	0
Throw 20 balls into a 45x45 cm box (times)	32	76.19	2	4.77	8	19.04
7-step hop (meters)	32	76.19	1	2.38	9	21.43
8 x 8m shuttle run (seconds)	33	78.57	3	7.14	6	14.28
Supine double raise (times)	32	76.19	0	0	10	23.81
400m standing start (seconds)	34	80.95	4	9.52	4	9.52
Push-ups (times)	25	59.52	6	14.28	11	26.57
5 x 30m standing start (Second)	22	52.38	12	28.57	8	19.04
5 x 60 seconds standing starts (Second)	18	42.85	12	28.57	12	28.57
Total standing jump height (m)	27	64.28	3	7.14	12	28.57
<b>Body shape and body function</b>						
Height (cm)	37	88.09	4	9.52	1	2.38
Weight (kg)	36	85.09	4	9.52	2	4.77
Cardiac function index	32	76.19	6	14.28	4	9.52
Vital capacity	33	78.57	8	19.04	1	2.38
blood pressure	25	59.52	7	16.66	10	23.8
VO2max	17	40.48	3	7.14	22	52.38

In order to test the reliability of the selected indicators, this paper analyzed the correlation coefficients between various evaluation indicators (athletic quality, body shape, and body

function) and sports performance of 49 Vietnamese male table tennis players aged 10-11 years old based on the Spear men's rank correlation coefficient.

**Table 2:** Correlation coefficients of the selected evaluation indicators in the two test results

Sl. No.	Test indicators	Start	7 days later	R
		Average value	Average value	
1	60m standing start (Second)	11.43	11.44	0.94
2	1 minute holding dumbbells and swinging arms forward and backward on both sides (times)	51.49	51.48	0.97
3	1 minute advantage hand-held dumbbell swing forward and backward (times)	46.96	46.50	0.89
4	1 minute single swing skipping (times)	102.27	102.31	0.93
5	Standing long jump (cm)	142.69	142.73	0.98
6	Badminton throw (meters)	565.0	565.40	0.98
7	1 minute sit-ups (times)	29.80	29.84	0.96
8	Move 3 meters and pick up 21 balls (seconds)	64.24	64.35	0.91
9	1 minute squats (times)	42.86	42.96	0.92
10	30m standing start (seconds)	5.77	5.81	0.85
11	Throw 20 balls into a box of 45x45 cm (Second-rate)	14.4	14.50	0.91
12	Weight (kg)	33.93	33.80	0.91
13	Height (cm)	133.43	133.54	0.91
14	Cardiac function index	9.33	9.31	0.89
15	Vital capacity	1.60	1.61	0.87
16	7-step hop (meters)	8.2	8.6	0.69
17	8 x 8m shuttle run (seconds)	20.2	19.3	0.72
18	Supine double raise (times)	16	18	0.74
19	400m standing start (seconds)	122	130	0.68

From Table 2.2 above, it can be seen that this paper will eliminate 4 evaluation indicators with correlation coefficient  $r < 0.8$ , namely: 7-step single-leg hop, 8 x 8- meter shuttle run, supine double start and 400- meter standing start. At the same

time, the selected evaluation indicators are divided into two groups: sports quality and body shape and body function, as shown in the following table:

**Table 3:** Correlation coefficients between body shape and body function evaluation indicators in the two test results

Sl. No.	Evaluation indicators	Start	7 days later	R <sub>x,y</sub>
		Average value	Average value	
1	Weight (kg)	33.93	33.80	0.91
2	Height (cm)	133.43	133.54	0.91
3	Cardiac function index	9.33	9.31	0.89
4	Vital capacity	1.60	1.61	0.87

From Table 2.3 above, we can see that:

For body shape: the correlation coefficients of height and weight test indicators are both 0.91, indicating that the selected evaluation indicators have a high correlation. Although athletic quality is the evaluation indicator that this article focuses on, in order to more accurately observe whether the changes in the athletes' morphology after two years of training are in line with the characteristics of this age group, this article selected height and weight as representatives and conducted tests.

For physical function: the correlation coefficients between cardiac function index and vital capacity are 0.89 and 0.87 respectively, indicating that the selected indicators have a high correlation. The main purpose of selecting these two evaluation indicators in this paper is to understand how the functions of various organ systems change under the influence of daily training loads. On this basis, the entire development process of the athletes' physical fitness level after two years of training is compared.

**Table 4:** Correlation coefficients of sports quality evaluation indicators in the two test results

Sl. No.	Evaluation indicators	Start	7 days later	R <sub>x,y</sub>
		Average value	Average value	
1	60 m standing start (seconds)	11.43	11.44	0.94
2	1 minute holding dumbbells and swinging arms forward and backward on both sides (times)	51.49	51.48	0.97
3	1 minute advantage hand-held dumbbell swing forward and backward (times)	46.96	46.50	0.89
4	1 minute single swing skipping (times)	102.27	102.31	0.93
5	Standing long jump (cm)	142.69	142.73	0.98
6	Badminton throw (meters)	565.0	565.40	0.98
7	1 minute sit-ups (times)	29.80	29.84	0.96
8	Move 3 meters and pick up 21 balls (seconds)	64.24	64.35	0.91
9	1 minute squats (times)	42.86	42.96	0.92
10	30m standing start (seconds)	5.77	5.81	0.85
11	Throw 20 balls into a box of 45x45 cm (Second-rate)	14.4	14.50	0.91
12	7-step hop (meters)	8.2	8.6	0.69
13	8 x 8m shuttle run (seconds)	20.2	19.3	0.72
14	Supine double raise (times)	16	18	0.74
15	400m standing start (seconds)	122	130	0.68

Among the above 15 evaluation indicators, only 11 indicators with correlation coefficient  $r > 0.8$  were selected as evaluation indicators of the sports quality group, namely: 60-meter standing start, 1 minute holding dumbbells and swinging arms forward and backward in sequence, 1 minute holding dumbbells and swinging arms forward and backward, 1 minute single-swing rope skipping, standing long jump, throwing badminton, 1 minute sit-ups, 3 meters moving to pick up 21 balls, 1 minute squats, 30-meter standing start and throwing 20 balls into a 45x45 cm box. The indicators with correlation coefficient  $r < 0.8$  will be eliminated, namely 7-step single-leg hops, 8 x 8-meter shuttle run, supine double-end start and 400-meter standing start.

Therefore, after the reliability test, this paper finally selected 15 evaluation indicators for the physical fitness level of Vietnamese male table tennis players aged 10-11, as shown in the following table:

## 2.2 Physical fitness level of Vietnamese male table tennis players aged 10-11 years reliability of physical fitness level evaluation indicators

In order to test the reliability of the indicators, this article will

test the selected indicators three times, at the beginning, after one year of training, and after two years of training. At the same time as each test, we will divide the athletes into groups and compete in a single round-robin format to evaluate the athletes' ranking in the competition and judge the degree of correlation between the selected indicators and their athletic performance. On this basis, it can be inferred that after one and two years of training, those parity indicators have a direct and close relationship with the athletes' athletic performance. In addition, through the correlation coefficient between each parity indicator and athletic performance, it can be seen that the indicators with the best stability and the closest correlation are used as reference for the later stage. The above are the outstanding features of the reliability of indicators.

**Table 5:** Number of selected indicators for the physical fitness level evaluation of Vietnamese male table tennis players aged 10-11

Sl. No.	Evaluation index classification	Number of evaluation indicators
1	Body shape and body function	4 items
2	Athletic quality	11 items

**Table 6:** Correlation coefficients between sports quality evaluation indexes and sports performance of Vietnamese male table tennis players aged 10-11

Sl. No.	Evaluation indicators	First Test		Second test		Third test	
		R	P	R	P	R	P
1	60 m standing start (seconds)	0.709	< 0,05	0.789	< 0,05	0.735	< 0,05
2	1 minute holding dumbbells and swinging arms forward and backward on both sides (times)	0.667	< 0,05	0.641	< 0,05	0.684	< 0,05
3	1 minute advantage hand-held dumbbell swing forward and backward (times)	0.735	< 0,05	0.684	< 0,05	0.708	< 0,05
4	1 minute single swing skipping (times)	0.708	< 0,05	0.693	< 0,05	0.749	< 0,05
5	Standing long jump (cm)	0.684	< 0,05	0.725	< 0,05	0.679	< 0,05
6	Badminton throw (meters)	0.742	< 0,05	0.679	< 0,05	0.708	< 0,05
7	1 minute sit-ups (times)	0.727	< 0,05	0.749	< 0,05	0.666	< 0,05
8	Move 3 meters and pick up 21 balls (seconds)	0.693	< 0,05	0.665	< 0,05	0.684	< 0,05
9	1 minute squats (times)	0.652	< 0,05	0.735	< 0,05	0.765	< 0,05
10	30m standing start (seconds)	0.765	< 0,05	0.841	< 0,05	0.725	< 0,05
11	Throw 20 balls into the target	0.834	< 0,05	0.867	< 0,05	0.802	< 0,05

From Table 2.6 above, we can see that:

- The results of the first test showed that there were seven indicators with correlation coefficients  $r > 0.7$ , and there was a significant difference ( $p < 0.05$ ), indicating that the seven indicators were highly correlated with sports performance. Specifically, they included: 60-meter standing start, 1-minute hand-held dumbbell swing, 1-minute single-crank clock skipping, badminton throwing, 1-minute sit-ups, and throwing 20 balls into a 45 x 45 cm square. The correlation coefficients of the four indicators, namely 1-minute holding dumbbells and swinging arms forward and backward on both sides, standing long jump, 3-meter moving keys 21 balls, and 1-minute squats, were  $r < 0.7$ , and there was a significant difference ( $p < 0.05$ ), indicating that the correlation between the four indicators and sports performance was only at a medium level.
- The results of the second test showed that the correlation coefficients of six indicators, namely 1-minute squats, standing long jump, 30-meter standing start, throwing 20 balls into a 45 x 45 cm box, 1-minute sit-ups, and 60-meter standing start, were  $r > 0.7$ , and there was a significant difference ( $p < 0.05$ ), indicating that this indicator has a high correlation with sports performance. The correlation coefficients of the other five indicators, namely 1-minute holding dumbbells and swinging arms forward and backward on both sides, 1-minute holding dumbbells and swinging arms forward and backward, 1-minute skipping, throwing badminton, and picking up 21 balls in 3 meters, were  $r < 0.7$ , and there was a significant difference ( $p < 0.05$ ), indicating that the correlation between this indicator and sports performance is not high and is only at a medium level.
- The results of the third test showed that the correlation coefficients of the seven indicators, namely, 60-meter standing start, 1-minute dumbbell swinging forward and backward, 1-minute single-swing rope skipping, badminton throwing, 1-minute squat, 30-meter standing start, and throwing 20 balls into a box with an area of 45 x 45 cm, were  $r > 0.7$  and had significant differences ( $P < 0.05$ ), indicating that the indicators had a high correlation with sports performance. The correlation coefficients of the indicators, namely, 3-meter moving to pick up 21 balls, 1-minute sit-ups, 1-minute dumbbell swinging forward and backward, and standing long jump were  $r < 0.7$ , and had significant differences ( $P < 0.05$ ), indicating that the correlation of the four indicators with sports performance was only at a medium level.

It can be seen that there are seven indicators with a correlation

coefficient  $r > 0.7$  in the three test results, indicating that the correlation between the indicator and the sports performance is high; the indicators with a correlation coefficient  $r < 0.7$  indicate that the correlation between these indicators and the sports performance is not high, only at a medium level. The test results show that the above indicators are all in line with the evaluation indicators of table tennis players aged 10-11. This article divides these indicators into two groups: body shape, body function and sports quality, as shown in the following table

**Table 2.7:** Results of selected indicators of physical fitness level of Vietnamese male table tennis players aged 10-11

Sl. No.	Group	Evaluation indicators
1	Body shape and body function	Height (cm)
2		Weight (kg)
3		Cardiac function index
4		Vital capacity
5	Athletic quality	60m standing start (seconds)
6		1 minute holding dumbbells and swinging arms forward and backward on both sides (times)
7		1 minute advantage hand-held dumbbell swing forward and backward (times)
8		1 minute single swing skipping (times)
9		Standing long jump (cm)
10		Badminton throw (meters)
11		1 minute sit-ups (times)
12		Move 3 meters and pick up 21 balls (seconds)
13		1 minute squats (times)
14		30m standing start (seconds)
15		Throw 20 balls into a box of 45x45 cm (Second-rate)

As for the evaluation index of body shape and body function: this article will not calculate the correlation coefficient of this index. The purpose of selecting these evaluation indexes is to observe the development of athletes' body shape and physical health level and provide a reference basis. However, this index can also reflect the development trend of athletes' physique under the load of training process to a certain extent. As for the evaluation index of sports quality: the selected index has met the comprehensive requirements, that is, it includes two general sports qualities and special sports qualities. Among them, the evaluation index of special sports quality involves speed strength, speed, agility and speed endurance to meet the characteristics of table tennis.

### 3. Conclusion

- All selected indicators are closely related to sports performance and have a high correlation. In general, the

correlation coefficients between these indicators and sports performance have certain changes. They will change with the changes in the athlete's special ability and the actual competition situation, indicating the importance of the training process in selecting the physical fitness level evaluation indicators of table tennis players.

- 2) The 15 items selected as the physical fitness evaluation indicators for Vietnamese male table tennis players aged 10-11 have passed the reliability test and have high reliability. This indicator will provide a reference basis for the evaluation of the physical fitness of table tennis players with practical significance.
- 3) The characteristic of a large number of selected evaluation indicators is that the evaluation of the physical fitness level of table tennis players is more accurate and effective, but it also has many difficulties such as complex organizational forms and the need to consume a lot of time and money.

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