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Developing Standards for Assessing Circulatory and Respiratory Function of First-Year Male Students Majoring in Athletics, Swimming and Volleyball at Hanoi University of Physical Education and Sports

Tran Dinh Tuong

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Abstract

By routine research methods in physical training and sports, the article tested the representativeness of the mean and the normal distribution of the circulatory and respiratory indices of the first-year male students at the university. Hanoi University of Physical Education and Training, from which to develop classification standards, grading scale, and general evaluation criteria for circulatory and respiratory functions of male first-year male students of Hanoi University of Sports and Education.

***Keywords*— Circulatory, respiratory, student, Hanoi University of Sports and Education.**

I. INTRODUCTION

Research on circulatory and respiratory function for students and athletes with different scales to provide a large amount of meaningful information on theory as well as practice to improve the quality of teaching and training. In the teaching and training of sports in general, athletics, swimming, and volleyball in particular, in addition to the application of means of professional exercises to improve academic achievement and results, the process of Evaluation of motor parameters through physiological indicators contributes to building an indicator system and adjusting the amount of exercise and appropriate training methods to improve teaching and training effectiveness.

There have been many types of research to conduct longitudinal monitoring of the exercise process of research subjects, some topics separate the circulatory and respiratory indexes for research, others simultaneously study bodybuilding and function. ability to assess the influence of bodybuilding on body function during exercise. However, research and development of standards for assessing circulatory and respiratory functions of students at Hanoi University of Sports and Education in general, and specialized in athletics, swimming, and volleyball in particular have not been given due attention...

Stemming from the above reason, we conducted a study: "Developing criteria for assessing the circulatory and respiratory function of first-year male students majoring in athletics, swimming, and volleyball at the University of Physical Education Hanoi sport".

Research methods: the research process used methods: analysis and synthesis of documents, medical examination, and mathematical statistics.

II. RESEARCH RESULTS AND DISCUSSION

1. Testing the representativeness of the mean and the normal distribution of the circulatory and respiratory indices of the first-year male students at Hanoi University of Sports and Education

The topic uses the Cortex MetaMax 3B machine system that allows the simultaneous acquisition of circulatory and respiratory function parameters during maximum exertion testing to assess circulatory and respiratory function in movement and silence. of male students in the first year of 3 sports: Volleyball, Athletics, and Swimming, Hanoi University of Physical Education and Sports. Data collection phases were conducted at the beginning of the academic year 2017-2018.

From the obtained medical examination results, we tested the representativeness of the mean and the normal distribution of the circulatory and respiratory indices of the first-year male students at the University of Education. Hanoi Sports. The results obtained are shown in Table 1.

From the results in Table 1, it can be seen that:

All test indicators have parameter ε<0.05, showing mean and standard deviation ensuring representativeness and Shapiro-Wilk value > 0.05, ensuring the normal distribution of the sample set. This result shows that the mean and standard deviation of the test contents can be used to build a scale and criteria for assessing the circulatory and respiratory function of male first-year intensive students. Volleyball, athletics, swimming, Hanoi University of Sports and Education.

Table 1. Test of representativeness of mean and normal distribution of circulatory and respiratory indices of first-year male students at Hanoi University of Pedagogy, Sports, and Education

Ordinal	Index	**Volleyball** *(n=12)*					**Athletics** *(n = 14)*					**Swimming** *(n = 12)*				
		$\bar{x} \pm \sigma$		ε	Shapiro-Wilk		$\bar{x} \pm \sigma$		ε	Shapiro-Wilk		$\bar{x} \pm \sigma$		ε	Shapiro-Wilk	
					Value	p				Value	p				Value	p
1	Tidal volume (VT)	2.55	0.04	0.01	0.89	0.11	2.58	0.06	0.02	0.97	0.91	2.60	0.04	0.02	0.73	0.06
2	Respiratory rate (Rf)	55.46	0.32	0.04	0.86	0.06	55.67	0.50	0.03	0.94	0.36	55.79	0.5	0.02	0.93	0.41
3	Maximum minute ventilation (MV)	145.22	0.76	0.04	0.92	0.26	145.69	0.49	0.03	0.87	0.06	145.83	0.85	0.03	0.95	0.60
4	Absolute volume of oxygen absorbed VO2 max (liter/min)	3.65	0.13	0.04	0.97	0.92	3.71	0.16	0.04	0.98	0.95	3.72	0.07	0.02	0.96	0.83
5	Exhaled carbon dioxide volume absolute VCO2 (liter/min)	5.06	0.19	0.05	0.94	0.56	5.07	0.17	0.04	0.97	0.93	5.15	0.06	0.02	0.94	0.48
6	Respiratory quotient (RER)	1.36	0.07	0.02	0.92	0.28	1.40	0.05	0.01	0.96	0.68	1.41	0.08	0.02	0.87	0.07
7	Relative VO2 max (ml/min/kg)	60.83	0.55	0.04	0.88	0.10	61.20	0.50	0.04	0.93	0.31	61.13	0.58	0.04	0.93	0.35
8	Relative VCO2 max (ml/min/k	76.92	0.64	0.03	0.87	0.06	77.26	0.54	0.04	0.86	0.06	77.36	0.49	0.04	0.92	0.27

	g)															
9	Maximum heart rate HRmax (beats/min)	182.17	4.13	0.04	0.95	0.66	184.07	5.06	0.05	0.83	0.07	183.50	5.93	0.05	0.82	0.07
10	Oxygen index – pulse VO2/HR	16.89	0.73	0.4	0.93	0.39	17.16	0.45	0.04	0.97	0.88	17.20	0.68	0.03	0.87	0.06
11	Heart rate HR (beats/min)	69.92	2.27	0.03	0.98	1.00	69.29	2.58	0.04	0.98	0.95	68.17	2.33	0.04	0.85	0.08
12	Respiratory rate (Rf, times)	0.14	0.01	0.01	0.91	0.19	0.14	0.01	0.01	0.92	0.19	0.14	0.01	0.01	0.94	0.45
13	Atrial systole time (s)	0.37	0.01	0.01	0.98	0.96	0.37	0.01	0.01	0.94	0.41	0.38	0.01	0.01	0.96	0.72
14	Systolic time (s)	0.88	0.04	0.01	0.80	0.07	0.90	0.02	0.01	0.92	0.20	0.90	0.04	0.01	0.88	0.08
15	Cardiac cycle (s)	19.16	0.37	0.11	0.90	0.18	19.07	0.37	0.03	0.91	0.16	18.91	0.39	0.02	0.83	0.07
16	Vital capacity (liters)	4.08	0.16	0.05	0.98	0.99	4.16	0.14	0.04	0.93	0.33	4.16	0.19	0.01	0.94	0.51

2. Developing a scoring scale and criteria for assessing the circulatory and respiratory function of first-year male students specializing in volleyball, athletics, and swimming at Hanoi University of Pedagogy, Pedagogy and Sports.

2.1. Developing criteria for the classification of indicators of circulatory and respiratory function of male first-year students specializing in volleyball, athletics, swimming at Hanoi University of Pedagogy, Sports and Sports

From the statistical results in Table 1, the topic classifies each indicator of circulatory and respiratory function of male first-year students specializing in volleyball, athletics, and swimming at the University of Physical Education and Training. Sports Hanoi, into 5 levels: Good, good, average, weak, poor according to the 2 chain - ma rule. In the content of the article, we present an illustration of the criteria for classifying the circulatory and respiratory functions of men. 1st-year volleyball students in Table 2.

2.2. Building a scale of indicators to assess circulatory and respiratory functions of male first-year students specializing in volleyball, athletics, swimming at Hanoi University of Pedagogy, Sports and Physical Education

To easily evaluate and monitor the development of the circulatory and respiratory function of students in each criterion, and at the same time to be able to compare between students, the topic refers to the criteria for assessing weekly function. Completeness and respiratory rate of first-year male students specializing in volleyball, athletics, and swimming at Hanoi university of physical education and sports given points on a c scale (scale of 10), in which the average number corresponds to point 5 of the scale. In the content of the article, we present an illustration of the rating scale of first-year male volleyball students in table 3.

2.3. Developing criteria for assessing the total circulatory and respiratory function of male first-year students specializing in volleyball, athletics, swimming at Hanoi University of Physical Education and Sports

From the above research results, to evaluate the circulatory and respiratory functions of first-year male

students specializing in volleyball, athletics, and swimming at Hanoi University of Physical Education and Sports, including 16 indicators. Thus, the maximum score achieved by athletes is 160 points, and the minimum is 16 points. The topic is to develop standards for a general assessment of circulatory and respiratory functions of first-year male students specializing in volleyball, athletics, swimming at Hanoi University of Pedagogy, Physical Education and Sports, according to 5 levels: good, fair, average, weak and poor, and the distance between the levels is:

(xmax – xmin)/5 = (160 – 16)/5 = 28.8 (đ).

The results of developing standards to evaluate the general circulatory and respiratory functions of male first-year students specializing in volleyball, athletics, and swimming are presented in Table 4.

Table 2. Criteria for classification of indicators of circulatory and respiratory function of male first-year volleyball-intensive students at Hanoi University of Physical Education and Sports

Ordinal	Index	Classification standards				
		Least	Weak	Medium	Pretty	Good
1	Tidal volume (vt)	<2.47	2.48-2.51	2.52-2.59	2.6-2.63	>2.64
2	Respiratory rate (rf)	<54.82	54.83-55.14	55.15-55.78	55.79-56.1	>56.11
3	Maximum minute ventilation (mv)	<143.7	143.71-144.46	144.47-145.98	145.99-146.74	>146.75
4	The absolute volume of oxygen absorbed vo2 max (liter/min)	<3.39	3.4-3.52	3.53-3.78	3.79-3.91	>3.92
5	Exhaled carbon dioxide volume absolute vco2 (liters/minute)	>5.44	5.43-5.25	5.24-4.87	4.86-4.68	<4.67
6	Respiratory quotient (rer)	>1.5	1.49-1.43	1.42-1.29	1.28-1.22	<1.21
7	Relative Vo2 max (ml/min/kg)	<59.73	59.74-60.28	60.29-61.38	61.39-61.93	>61.94
8	Relative Vco2 max (ml/min/kg)	>78.2	78.19-77.56	77.55-76.28	76.27-75.64	<75.63
9	Maximum heart rate max (beats/min)	>190.43	190.42-186.3	186.29-178.04	178.03-173.91	<173.9
10	Oxygen index – circuit vo2/hr	<15.43	15.44-16.16	16.17-17.62	17.63-18.35	>18.36
11	Heart rate hr (beats/min)	>74.46	74.45-72.19	72.18-67.65	67.64-65.38	<65.37
12	Respiratory rate (rf, times)	>0.16	0.15-0.15	0.14-0.13	0.12-0.12	<0.11
13	Atrial systole time (s)	>0.39	0.38-0.38	0.37-0.36	0.35-0.35	<0.34
14	Systolic time (s)	>0.96	0.95-0.92	0.91-0.84	0.83-0.8	<0.79
15	Cardiac cycle (s)	<18.42	18.43-18.79	18.8-19.53	19.54-19.9	>19.91
16	Vital capacity (liters)	<3.76	3.77-3.92	3.93-4.24	4.25-4.4	>4.41

Table 3. Scale of indicators for assessing circulatory and respiratory functions of male first-year volleyball-intensive students at Hanoi University of Physical Education and Sports

Ordinal	Index	Point									
		1	2	3	4	5	6	7	8	9	10
1	Tidal volume (vt)	2.47	2.49	2.51	2.53	2.55	2.57	2.59	2.61	2.63	2.65
2	Respiratory rate (rf)	54.82	54.98	55.14	55.30	55.46	55.62	55.78	55.94	56.10	56.26
3	Maximum minute ventilation (mv)	143.70	144.08	144.46	144.84	145.22	145.60	145.98	146.36	146.74	147.12
4	Absolute volume of oxygen absorbed vo2 max	3.39	3.46	3.52	3.59	3.65	3.72	3.78	3.85	3.91	3.98

	(liter/min)										
5	Exhaled carbon dioxide volume vco2 absolute (liters/min)	5.44	5.35	5.25	5.16	5.06	4.97	4.87	4.78	4.68	4.59
6	Respiratory quotient (rer)	1.50	1.47	1.43	1.40	1.36	1.33	1.29	1.26	1.22	1.19
7	Relative Vo2 max (ml/min/kg)	61.93	61.66	61.38	61.11	60.83	60.56	60.28	60.01	59.73	59.46
8	Relative Vco2 max (ml/min/kg)	78.20	77.88	77.56	77.24	76.92	76.60	76.28	75.96	75.64	75.32
9	Maximum heart rate hrmax (beats/min)	190.43	188.37	186.30	184.24	182.17	180.11	178.04	175.98	173.91	171.85
10	Oxygen index – circuit vo2/hr	15.43	15.80	16.16	16.53	16.89	17.26	17.62	17.99	18.35	18.72
11	Heart rate hr (beats/min)	74.46	73.33	72.19	71.06	69.92	68.79	67.65	66.52	65.38	64.25
12	Respiratory rate (rf, times)	0.16	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.12	0.12
13	Atrial systole time (s)	0.39	0.39	0.38	0.38	0.37	0.37	0.36	0.36	0.35	0.35
14	Systolic time (s)	0.96	0.94	0.92	0.90	0.88	0.86	0.84	0.82	0.80	0.78
15	Cycle time (s)	18.42	18.61	18.79	18.98	19.16	19.35	19.53	19.72	19.90	20.09
16	Vital capacity (liters)	3.76	3.84	3.92	4.00	4.08	4.16	4.24	4.32	4.40	4.48

Table 4. Criteria to evaluate the general circulatory and respiratory functions of male first-year students specializing in volleyball, athletics, and swimming

Ordinal	**Standard**	**Point** *(maximum score 160)*
1	Good	> 131.2
2	Pretty	102.4 – 131.2
3	Medium	73.6 – 102.4
4	Feebleness	44.8 – 73.6
5	Least	< 44.8

III. CONCLUSION

From the above research results, we have the following conclusions:

Tested the representativeness of the mean and the normal distribution of the circulatory and respiratory indices of the first-year male students at Hanoi University of Physical Education and Sports. The results show that the mean and standard deviation of the contents of the test can be used to build a scale and criteria for assessing the circulatory and respiratory function of the first-year male students who specialize in football. volleyball, athletics, swimming, Hanoi University of Pedagogy of Physical Education and Sports.

The classification criteria, scoring scale, and general assessment criteria for circulatory and respiratory functions have been developed for male first-year students specializing in volleyball, athletics, and swimming at the University of Physical Education and Sports. Hanoi. Classification criteria, scoring scale, and synthetic evaluation criteria can be conveniently used in classifying and evaluating the circulatory and respiratory function of first-year male students.

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