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The influence of anthropometric indicators on the competitive results of high jump masters at the stage of long-term training

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Abstract

Purpose: The aim is to study the influence of anthropometric parameters on the competitive results of long-term training of high jumpers.

Methods: During the long-term training of women high jumpers, methods, means and processes of load distribution corresponding to anthropometric indicators for the training and competition process were studied. In the course of the research, such methods as the analysis of scientific and methodological literature, theoretical and comparative analysis, questionnaires, pedagogical observation, conversation, comparison, pedagogical experience, mathematical statistics were widely used.

Results: Athletes of the control group are considered athletes with a "strong-jumping" and "universal" jumping character. As for the anthropometric indicators of these athletes, the average height was 175.0 cm, trunk length 92.3 cm, leg length 82.7 cm, Quetelet index 315.8 cm / kg, body proportions index 89.7%. The coefficient of variation showed a significant difference in all indicators of athletes compared to the experimental group.

Conlcusion: At the stage of high sportsmanship, the general and special levels of training of athletes can differ significantly, which is determined by the individual characteristics of long-term training.

Keywords: high jumpers, sports results, integral training, vertical speed, initial flight speed.

Introduction

The current stage of the development of world athletics is characterized by increased competition at major competitions. In such conditions, scientific and methodological technologies of the training process, effective management of athletes' training become important. As the most important condition for increasing the ability to manage the training process at the stage of high sportsmanship, the main attention is paid to improving the effectiveness of results, taking into account the individual aspects of special training of athletes. This, in turn, requires the use of new and creative means of training, taking into account the peculiarities of the technical training of highly qualified athletes.

Scientists and researchers in the world conduct scientific research aimed at planning the system of training and training processes of highly qualified athletes specializing in jumping athletics, in accordance with the requirements of the time and conducting training. When analyzing the studied scientific literature, there are many studies devoted to solving problems related to the planning of annual training for high jumps, the means and methods used in training processes in accordance with the physical fitness of athletes, the proportions of general physical training and special physical training loads, the intensity of performance, the number of repetitions, rest intervals. The problems associated with the use of means and methods in connection with the peculiarities of jumping in improving the technical training of athletes, conducted by scientists, have found insufficient application.

In our republic, the training of highly qualified athletes, the management of training processes with the help of modern pedagogical technologies are becoming increasingly popular and are becoming priorities. "Representatives of our country achieve high results at the Olympic Games, World Championships, Asian Games and championships and international competitions, the authority and sports potential of Uzbekistan in the world is increasing, magnificent sports facilities are being built in the regions of our republic that meet international standards, sports games between students and students are becoming increasingly popular, which are held in three stages "Umid nihollarиш", "Barkamol avlod" and "Universiada". In this regard, the main tasks include measures to increase the popularity of athletics, training athletes who will adequately defend the honor of our country on world arenas, conducting and organizing multi-year training camps. When planning the training process of high jumpers, taking into account the individual characteristics of athletes, the connection of the means and methods used with the goals and objectives set before training has a positive effect on the system of training highly qualified athletes. However, we see a lag (on average by 6-8 cm) when comparing the sports results of our high jumpers with the results on the world arenas.

The fact that there are still no winners of the World and Olympic Games makes it necessary to develop a variant of technical training of athletes based on the principle of individuality.

Methods

Based on the analysis of video images of competitive attempts by highly qualified high jumpers, a number of parameters of their technical training have been determined. The leading jumpers of Uzbekistan (n=16) demonstrated various aspects of jumping using the "fosbury flop" method.

Results and discussion

At the same time, the level of dependence on the physical fitness of tall and long-legged athletes, as well as short athletes, was studied by linking the level of general and special physical fitness to anthropometric indicators and indicators of technical components in the athletes' training system.

To test these ideas, indicators of the level of individual physical development of athletes before and after the experiment were determined (see tables 1, 2).

Athletes of the experimental group are considered athletes with physical qualities of a jumping character "sprinter-strong" and "sprinter-jumper". As for the anthropometric indicators of these athletes, the average height was 177.9 cm, body length 91.4 cm, leg length 86.5 cm, Quetelet index 305.9 g/cm, body proportions index (IPT) 94.7%. The coefficient of variation showed a big difference in the age of athletes.

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Table 1. Anthropometric indicators of the leading high jumpers of Uzbekistan (participants of the experimental group)

№	Full name	Age	Height-(cm)	Weight-(kg)	Body length-(cm)	Leg length-(cm)	Foot length-(cm)	QI	BPI
1	R-l S	33	185	53	94	91	26	286	96.1%
2	D-a H	33	174	56	92	82	25.7	322	88.7%
3	S-a S	22	184	54	92	92	25.7	293	100.0%
4	S-a B	15	173	51	88	85	25.4	295	96.1%
5	A-a A	16	175	55	91	84	25.4	314	92.3%
6	G-a V	17	175	53	91	84	25.7	303	92.3%
7	V-a E	28	177	62	92	85	25.7	350	92.3%
8	Ch-a A	15	180	51	90	90	26	283	100.0%
	$\bar{X}$	22.4	177.9	54.4	91.3	86.6	25.7	305.8	94.7%
	σ	7.89	4.61	3.54	1.75	3.78	0.23	22.31	4.02
	V%	**35.3**	**2.6**	**6.5**	**1.9**	**4.4**	**0.9**	**7.3**	**4.2**

Table 2. Anthropometric indicators of the leading high jumpers of Uzbekistan (participants of the control group)

	Full name	Age	Height-(cm)	Weight-(kg)	Body length-(cm)	Leg length-(cm)	Foot length-(cm)	KI	BPI
1	K-a Sh	16	178	54	94	84	25.7	303	88.7%
2	Ba- K	17	177	50	90	87	25.7	282	96.1%
3	G-a Sh	19	174	51	92	82	25.4	293	88.7%
4	Sh-a A	22	176	54	90	86	25.4	307	96.1%
5	Sh-a O	20	172	57	91	81	25	331	88.7%
6	H-a S	17	175	59	91	84	25.7	337	92.3%
7	A-a M	17	176	64	95	81	26	364	85.2%
8	J-a Z	18	172	53	95	77	25	308	81.8%
	$\bar{X}$	18.3	175.0	55.3	92.3	82.7	25.5	315.8	89.7
	σ	6.95	53.31	15.74	27.74	25.04	7.71	93.67	27.49
	V%	**38.08**	**30.46**	**28.48**	**30.06**	**30.27**	**30.26**	**29.67**	**30.65**

technical training have been determined. The leading high jumpers of Uzbekistan (n=16) demonstrate various manifestations of the jumping character in the Fosbury-flop method, the variability of their kinematic indicators at a height of 1.80 m, the same for all analyzed athletes, has reached significant values (see table 3).

Note: for convenience, in Tables 3 and 4, the indicators are defined as follows: 1- speed at the last stage, m/s.; 2- tempo when 4 steps left till push-off, n/s.; 3- tempo when 3 steps left till push-off, n/s.; 4- tempo when 2 steps left till push-off, n/s.; 5- tempo in last step till push-off, n/s.; 6 - Moderate pace, 3 steps n/s.; 7 – tempo of mobilization coefficient; 8 - base time in push-off, s; 9 - The angle of bending of the knee during the depreciation phase of the last step, degree; 10- The angle of placing the foot to push-off, degree; 11 - The angle between the hips when placing the leg to push-off, degree; 12- the angle of flexion of the knee joint during depreciation, degree; 13- the angle of flexion of the hip during depreciation, degree; 14- the height of the

Table 3. Dynamics of changes in statistical parameters and indicators of the spread of technical training in the experience of high jumpers of the experimental group in a jump of 1.80 m (n= 16)

№	At the beginning of the experiment			At the end of the experiment					
	$\bar{X}$	σ	V, %	$\bar{X}$	σ	V, %	Relative growth, %	t	P
1	6.85	0.68	9.93	7.72	0.72	9.33	12.70	3.51	<0.01
2	2.34	0.32	13.68	2.90	0.38	13.10	23.93	4.51	<0.001
3	2.94	0.35	11.90	3.54	0.39	11.02	20.41	4.58	<0.001
4	3.48	0.45	12.93	4.09	0.51	12.47	17.53	3.59	<0.01
5	4.19	0.46	10.98	4.64	0.49	10.56	10.74	2.68	<0.05
6	3.39	0.4	11.80	4.09	0.46	11.25	20.65	4.59	<0.001
7	1.16	0.12	10.34	1.31	0.12	9.16	12.93	3.54	<0.01
8	104.43	13.48	12.91	122.27	14.84	12.14	17.08	3.56	<0.01
9	41.77	4.54	10.87	49.50	5.03	10.16	18.51	4.56	<0.001
10	41.39	5.37	12.97	51.00	6.28	12.31	23.22	4.65	<0.001
11	116.03	16.22	13.98	144.30	19.04	13.19	24.36	4.52	<0.001
12	129.32	15.47	11.96	144.00	16.12	11.19	11.35	2.63	<0.05
13	**62.64**	**6.85**	**10.94**	**74.50**	**7.66**	**10.28**	**18.93**	**4.62**	**<0.001**

Note: for convenience, in Tables 3 and 4, the indicators are defined as follows: 1- speed at the last stage, m/s.; 2- tempo when 4 steps left till push-off, n/s.; 3- tempo when 3 steps left till push-off, n/s.; 4- tempo when 2 steps left till push-off, n/s.; 5- tempo in last step till push-off, n/s.; 6 - Moderate pace, 3 steps n/s.; 7 – tempo of mobilization coefficient; 8 - base time in push-off, s; 9 - The angle of bending of the knee during the depreciation phase of the last step, degree; 10- The angle of placing the foot to push-off, degree; 11- The angle between the hips when placing the leg to push-off, degree; 12- the angle of flexion of the knee joint during depreciation, degree; 13- the angle of flexion of the hip during depreciation, degree; 14-the height of the total center of gravity relative to the ground during depreciation.

Table 4. Dynamics of changes in statistical parameters and indicators of the spread of technical training in the experience of high jumpers of the control group in a jump of 1.80 m (n= 16) of 1.80 m (n= 16)

№	At the beginning of the experiment			At the end of the experiment					
	$\bar{X}$	σ	V, %	$\bar{X}$	σ	V, %	Relative growth, %	t	P
1	6.36	0.62	9.75	6.75	0.62	9.19	6.13	1.78	>0.05
2	2.46	0.33	13.41	2.72	0.36	13.24	10.57	2.13	<0.05
3	3.07	0.36	11.73	3.34	0.37	11.08	8.79	2.09	<0.05
4	3.32	0.42	12.65	3.59	0.44	12.26	8.13	1.78	>0.05
5	4.28	0.45	10.51	4.56	0.46	10.09	6.54	1.74	>0.05
6	3.52	0.41	11.65	3.83	0.43	11.23	8.81	2.09	<0.05
7	1.19	0.13	10.92	1.27	0.13	10.24	6.72	1.74	>0.05
9	101.36	12.78	12.61	109.54	13.37	12.21	8.07	1.77	>0.05
10	41.32	4.37	10.58	44.64	4.58	10.26	8.03	2.10	<0.05
11	41.79	4.42	10.58	45.14	4.64	10.28	8.02	2.09	<0.05
12	117.84	14.83	12.58	129.14	15.58	12.06	9.59	2.10	<0.05
13	130.96	15.34	11.71	140.62	15.68	11.15	7.38	1.76	>0.05
14	61.56	6.58	10.69	66.52	6.73	10.12	8.06	2.11	<0.05

We see that the difference between the technical indicators of high jumpers is clearly visible. At the same time, the same result of athletes and individual jump indicators differ significantly from the average. The conclusions drawn in this way are confirmed by significant differences in the ways athletes achieve results, especially at the stage of high sportsmanship.

Conclusion

Correlating the level of general and special physical fitness of experienced high jumpers at the training stage with anthropometric parameters and parameters of technical components, it was reflected that most tall and long-legged athletes have universal indicators, and, conversely, strength qualities and speed surpass other qualities in short athletes, which was clearly seen in our studies.

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