© Eurasian Journal of Sport Science 2021; 1(2): 165-171
https://eajss.uz

Indicators of the physique of handball players, taking into account their role in game

Tulaganov Shukhrat Furkatjanovich[1]
[1]Uzbekistan state university of physical education and sport, Chirchik, Uzbekistan

Abstract

Purpose: improvement of the training system for young handball players, taking into account their role in game.
Methods: analysis of educational and methodological literature, pedagogical testing, pedagogical observation, pedagogical experiment, morphological, physiological research methods, methods of mathematical statistics.
Results: the methodology of a comprehensive assessment of the effectiveness of the activities of handball players of various game functions has been developed, which made it possible to assess the level of preparedness of players, and coaches to carry out purposeful organization and differentiated planning of the training process of handball players of various roles in game.
Conclusion: in a comparative aspect, based on anthropometric indicators, an assessment of the physical development of qualified handball players of various roles in game is given, which can be used in the selective selection of players of the national youth team of the republic for recommendation to highly qualified teams.

Keywords: handball players, role in game, anthropometric data, fat folds, Hit-Carter method, endomorphic component, mesomorphic component, ectomorphic component, long-leg sizes, girth sizes.

Introduction

The methodological foundations of the long-term training of handball players are directly related to the problem of improving the training process. To further improve the methods of modern sports training, strict consistency of the orientation of the training process and the specific requirements of competitive activity in specific sports disciplines is necessary. In team playing sports, in particular, in handball, no criteria have yet been formulated that would make it possible to reliably predict the success of sports improvement on the basis of taking into account the role in the game and in the team, which was the rationale for this study.

Methods

The study was conducted between 2019 and 2021. The object of the study was 40 qualified handball players - boys (16-19 years old), an adult group (20-23 years old) - 40 handball players. Both groups of athletes have sports qualifications - Masters of sports, CMS and 1st category. The total number of handball players to assess the level of physical development was 80 people.

The total and partial body sizes of handball players were measured according to 24 anthropometric indicators: of these, 3 indicators were total sizes, 21 partial sizes, according to which the long, latitudinal and circumference sizes of body segments were determined. The thickness of the skin-fat folds was measured in a conventional way in 4 regions of the body: under the scapula, the upper iliac region, on the posterior surface of the lower leg and shoulder. The diameters (girths) of the shoulders, forearms, thighs and shins were also measured according to the traditional method.

Definition of types of constitutions by Heath-Carter, 1989. The type of constitution determined by the Heath-Carter 1989 method is one of the universal methods of somatotypology, and is used in almost all foreign laboratories of the world. The results of somatotyping obtained by us can be comparable with the data obtained in other laboratories. Initially, standard measurements were carried out according to 7 dimensional characteristics: the body length, the diameter of the distal part of the shoulder, the hip, the circumference of the shoulder in a tense state, the circumference of the lower leg were determined, and measurements of skin-fat folds in 4 regions of the body were carried out with a caliper. The somatotype was diagnosed based on an assessment of three components:
I F - fat component of endomorphy; II M - muscle component - mesomorphy; III - P/L - height -weight index.

The endomorphic component was calculated using the formula F=Σ/ sum of fat folds on

the posterior surface of the shoulder, under the shoulder blade, upper iliac, on the lower leg. Mesomorphic component M= Σ (sum of deviations) diameters of condyles of shoulder, hip, shin; 4 and 8 constants.

The ectomorphic component was determined by the formula L 3P - height-weight index.

Results and discussion

Analyzing the factors that limit athletic performance, it should be noted that the indicators of physique occupy a strong place among other parameters of the systemic organization of the body. This is not surprising, since many of them, such as total and partial body sizes, body proportions, somatotype, the component composition of body weight affect the success of sports activities, physical performance, the choice of sports specialization on the one hand, and on the other hand make it possible for coaches to use them for sports selection purposes. For example, long body sizes are crucial in handball, basketball, volleyball; girth sizes related to body weight play an important role in wrestling, weightlifting, powerlifting, boxing. Weight categories have been introduced in these sports. Table 1 shows the indicators of the total size of youth handball players. Since the youth period for boys takes place in 16-20 years, the average age of the examined handball players was 17.7±1.1, the average body length was 180.9±5.8 cm, the body weight was 76.1±7.8 kg, and the chest circumference was 93±4.8 cm. The handball program, prepared by a group of authors by D.V. Chetverikov, A.O. Nemicheva, N.A. Solodkov and others, 2019 presents model values of indicators of physical development of handball players undergoing sports training at the stage of sports improvement. In this program, the following indicators are characteristic for boys aged 17: Body length is 179.4 kg, body weight is 70.8 kg, chest circumference is 84.4 cm. Considering that the age of our contingent was 17.7 years, the established higher indicators of total body size correspond to the model characteristics.

However, in team sports, a game role is distinguished, characterized by the specifics of not only the physique of the players, but also the connection of the motor function performed. In connection with the above, it is extremely important to study the individual characteristics of youth handball players, taking into account their playing role. The analysis of indicators should be carried out not only to clarify the differences between players of different playing roles, but also with indicators of general and special physical fitness, with the results of competitive activity in order to identify the most informative values that can be used for sports selection. The team of handball players consists of players of 5 roles - this is the goalkeeper, the players in the field – playmaker, pivot, winger and central. In this work, we have assessed physical development based on anthropometric data of players of 5 roles:

Goalkeepers are characterized by high height - 180.5±2.66 cm, weight - 76.7±8.94 kg, chest circumference - 92.8±5.23 cm.

Partial sizes: The analysis of the long sizes showed that the length of the shoulder is 31.8±2.5 cm, the forearm is 26.8±2.14 cm, the length of the hand is 21.2±0.41 cm. It should be noted that the length of the goalkeeper's shoulder is characterized by variability, the indicators of this feature range from 30 cm to 34 cm. The length of the thigh is 47.3±3.56 cm, the length of the lower leg is 46.8±2.42 cm, the length of the foot is 43.74±0.53. As can be seen from the above data, the ratio of the length of the lower leg to the length of the thigh is almost equal. The analysis of girth sizes revealed the following: shoulder girth is characterized by massiveness compared to players of other roles and is -32.2±1.94. The forearm girth index is 27.3±1.37 cm, the hip girth value can be characterized as classic, similar to the hip indicators of highly qualified football players and is equal to 56.5±4.14 cm, and the shin girth was 38.0±1.79 cm. The analysis of the latitudinal sizes revealed the following features: the shoulder width also demonstrates an invariable feature characteristic of players of all types of roles and was - 42.0±2.14 cm, the mid-chest transverse index is - 29.2±2.04 cm, and the mid -chest sagittal index was - 19.8±2.56 cm. The thickness of the fat folds is within the normal limits, with the exception of the fat fold on the stomach and on the side, the values of which are slightly overestimated; on the side – 0.7±0.54 mm, and on the stomach - 0.8±0.55 mm.

Total playmakers sizes: body length - 184.4±4.54 cm, body weight - 82.7±10.42 kg, chest circumference - 97.4±5.74 cm. The body mass index may exhibit variability, since the mean square deviation has a high value δ=10.42. Moderate variability was detected in

Table 1. Total sizes of young handball players.

№	Full name	Age	Category	Role in game	Height	Mass	Chest girth
1	Sherbakov N.	19	MS	pivot	185	80	96
2	Tursunov M.	17	1st category	pivot	185	79	95
3	Jurayev D.	16	1st category	playmaker	188	87	97
4	Buriyev S.	18	MS	goalkeeper	177	84	98
5	Abdukharov M.	17	CMS	central	171	73	92
6	Satimov Sh.	18	1st category	pivot	178	64	89
7	Ganiyev O.	18	CMS	pivot	176	74	92
8	Tosgpulatov T.	18	CMS	central	173	71	96
9	Alimbekov A.	17	MS	winger	179	68	89
10	Abduvahidov A.	19	MS	central	182	75	89
11	Ibragimov A.	17	1st category	goalkeeper	178	72	91
12	Kholmurodov D.	18	CMS	playmaker	190	102	106
13	Tuychibayev B.	18	MS	pivot	188	74	98
14	Rustamov Z.	16	1st category	goalkeeper	180	77	96
15	Baratov G.	17	1st category	pivot	191	89	94
16	Yakubov B.	16	1st category	winger	170	70	91
17	Kim A.	17	1st category	winger	180	75	87
18	Bazarbayev D.	17	1st category	central	181	72	93
19	Yuldashev M.	20	CMS	playmaker	189	86	99
20	Karimov M.	19	CMS	goalkeeper	182	71	88
21	Shukurjanov M.	18	CMS	winger	176	74	93
22	Kamaldinov M.	20	MS	central	175	72	88
23	Eson F.	18	CMS	playmaker	180	75	95
24	Shavkatov B.	19	MS	pivot	176	74	97
25	Sobirjonov A.	18	CMS	goalkeeper	182	90	98
26	Musayev A.	18	1st category	playmaker	180	83	103
27	Mukhamadiyev S.	16	CMS	playmaker	184	74	92
28	Bakhtiyar Ali	18	CMS	central	167	67	90
29	Akhmadaliyev M.	16	CMS	central	185	76	91
30	Khusniddinov N.	18	CMS	pivot	182	71	85
31	Malakhov M.	18	CMS	winger	185	70	87
32	Malyushenko V.	16	CMS	playmaker	180	72	90
33	Akhmedov Y.	19	MS	winger	184	78	89
34	Nurmuradov A.	17	CMS	goalkeeper	184	66	86
35	Toshpelatov N.	18	MS	central	190	83	95
$\underline{x} \pm \sigma$		17.7±1.1			180.9±5.8	76.1±7.8	93±4.8

such an indicator as chest circumference and the sigma deviation was - δ= 5.74 chest circumference was - 97.4±5.74cm.

Partial sizes of playmakers: The girth sizes have been removed from the partial sizes, which are more dependent on exogenous factors compared to the longitudinal sizes of the body, which are under strict genetic control. Shoulder girth was 33.4 cm at δ=2.44, hip girth was 59.7 at δ=5.81 cm. Of the long-note sizes, the probability of variability was shown by the shoulder length indicator - 33.5 at δ=3.87. If we compare these data with the indicators of non-athletes obtained by V.P. Chitetsov, 1990 - hip circumference is 55.08 cm, δ=4.1, shoulder circumference was 28.27 cm, δ=2.4, then we can detect statistically significant hypertrophy of shoulder and hip tissues. There were no significant differences in circumference 31.43 in the lower leg and forearm. The latitudinal sizes for handball players indicate good physical development and a well-built physique. So the width of the shoulders was 42.3±2.81, the width of the chest in the middle-sternal transverse also has high values and is equal to 31.43 at δ=1.4, and the size of the middle-chest sagittal is 20.4

Table 2. Partial sizes of young handball players.

№	Long-length sizes						Circumference sizes			
	Shoulder	Forearm	Wrist	Hip	Thigh	Foot	Shoulder	Forearm	Hip	Thigh
1	33	28	23	50	50	44	34	28	57	40
2	32	27	23	49	51	44	33	27	56	39
3	33	31	21	43	49	44	35	30	59	40
4	32	24	21	47	46	43	35	29	57	39
5	28	25	20	46	44	41	34	29	57	39
6	31	27	20	50	47	43	28	24	52	35
7	31	27	21	44	47	43	33	30	57	38
8	29	27	21	49	48	42	33	28	52	36
9	34	26	20	49	43	42	32	28	53	37
10	32	28	22	43	48	43	34	28	52	38
11	32	25	21	46	46	43	31	27	54	38
12	32	27	22	43	48	45	37	31	70	44
13	34	27	21	50	48	44	32(l)	28	52	34
14	34	29	21	44	48	44	34	28	59	37
15	34	31	24	48	49	45	32	29	57	41
16	30	25	20	40	41	42	30	26	59	40
17	30	26	21	48	48	44	31	27	61	41
18	32	27	21	47	46	43	32	29	52	35
19	37	29	22	56	46	44	34	29	57	39
20	33	28	21	54	42	44	32	27	57	37
21	34	27	21	48	42	44	32	28	56	39
22	37	27	20	48	42	41	32	28	56	34
23	40	28	22	46	44	44	33	27	56	36
24	24	28	20	45	45	42	32	31	59	40
25	30	29	22	45	47	44	31	28	62	41
26	32	28	20	45	47	43	33	30	66	40
27	33	28	22	49	47	44	29	27	55	39
28	24	25	19	45	42	40	33	28	56	38
29	28	29	22	55	42	43	31	27	59	37
30	28	26	20	46	47	43	31	27	58	36
31	30	29	21	45	48	44	30	27	52	35
32	28	25	22	46	46	44	33	29	56	39
33	26	28	21	48	46	44	32	27	58	37
34	27	26	21	48	49	44	30	25	50	36
35	33	28	23	50	50	44	34	28	57	40
$\bar{x} \pm \sigma$	31.3±3.45	27.3±1.64	21.2±1.08	47.3±3.38	46.3±2.65	43.3±1.13	32.3±1.81	27.9±1.48	56.7±4	38.1±2.26

at δ=1.4. The values of sigma deviations are characterized by small values and indicate that these indicators are little variable.

Total sizes of pivots: Body length was 183.3±5.66 cm; body weight - 76±7.04 kg; chest circumference - 93.6±4.22. The total sizes have not yet reached definitive sizes, and the growth processes will continue, that is, they have not yet been completed, as evidenced by the values of sigma deviations. The greatest variability was revealed by body weight, which mostly depends on exogenous factors.

Partial sizes: Indicators of long-leg sizes indicate that special growth of the segments of the upper and lower extremities is not expected in the semi-average, since sigma deviations are below moderate, that is, long-leg sizes can be considered to be almost at the age of 17.7 years old. Indicators of girth sizes correspond to model characteristics, sigma deviations are below moderate, it can also be considered that a small increase in indicators is possible to a greater extent for girth sizes compared to long-length sizes, since long-length sizes are more influenced by genetic factors **(A.Y. Asanov, E.G. Martirosov, 1989, B.A. Nikityuk, 1996), (A.Y. Asanov, E.G. Martirosov - Some problems of genetic research in sports / in the collection Morphogenetic problems of sports selection Moscow, 1989, pages 30-45).**

Table 3. Morphological indicators of young handball players.

№	Diameters				Fat folds			
	Shoulder width	The mid-chest transverse	The mid-chest sagittal index	Pelvis Hip	Skin-fat folds	Under the shoulder blade	On the sides	On the stomach
1	44	31	21	33	0.7	0.8	0.7	0.6
2	43	31	20	32	0.7	0.8	0.6	0.5
3	41	29	21	31	0.7	0.7	0.6	0.8
4	41	32	21	32	0.7	0.7	0.8	1.1
5	38	29	18	30	0.5	0.6	0.5	0.5
6	40	28	17	29	0.3	0.6	0.3	0.4
7	40	30	16	29	0.4	0.7	0.4	0.5
8	40	27	21	31	0.5	0.7	0.6	0.6
9	41	29	18	30	0.4	0.6	0.4	0.4
10	44	29	19	30	0.5	0.7	0.5	0.6
11	44	29	21	31	0.3	0.6	0.3	0.5
12	46	32	22	32	0.6	0.8	0.5	0.5
13	45	31	20	31	0.4	0.6	0.4	0.5
14	44	30	21	31	0.4	0.8	0.5	0.7
15	46	31	21	31	0.7	0.9	0.5	0.6
16	43	26	20	30	0.9	0.7	0.5	0.7
17	45	32	16	34	0.6	0.7	0.7	0.7
18	44	31	19	30	0.6	0.8	0.4	0.6
19	42	31	20	32	0.7	0.6	0.5	0.6
20	40	26	15	30	0.3	0.5	0.4	0.5
21	41	30	19	30	0.4	0.6	0.3	0.5
22	40	26	20	28	0.5	0.8	0.5	0.8
23	39	31	18	28	0.5	0.7	0.2	0.4
24	45	30	22	28	0.5	0.4	0.8	0.8
25	43	30	22	33	0.9	0.8	17	18
26	45	37	22	35	0.8	0.7	1.2	1.2
27	39	32	20	34	0.5	0.5	0.8	1.0
28	44	30	19	29	0.5	0.5	0.8	0.8
29	43	30	22	31	0.5	0.5	0.5	0.8
30	44	29	18	31	0.7	0.5	0.3	0.6
31	43	30	18	31	0.5	0.7	0.3	0.5
32	44	28	20	30	0.5	0.5	0.3	0.5
33	44	28	21	31	0.8	0.8	0.5	0.8
34	39	28	19	30	0.3	0.3	0.3	0.3
35	45	32	21	33	0.7	0.8	0.7	0.6
$\bar{x} \pm \sigma$	42.5±2.24	29.8±2.11	19.7±1.85	32.9±1.69	0.56±0.17	0.66±0.14	0.55±0.29	0.67±0.28

The stable signs can be attributed to the semi-average body diameters - shoulder diameters, mid-chest transverse, sagittal and pelvic diameter. The values of fat folds are within the normal range, which is evaluated positively.

Total sizes of wingers: The body length of the wingers is -179±5.5 cm; body weight 72.5±3.8 kg; chest circumference - 89.3±2.3 cm. As can be seen from the values of sigma deviations, the signs can change, in particular, under the influence of training loads, and since they have not yet reached definitive sizes.

Partial sizes of wingers: Indicators of the long sizes of the segments of the upper limb are characterized by slightly reduced values for the length of the forearm and hand. However, the values of shoulder length practically do not differ from handball players specializing in other playing roles. As well as in other specializations, moderate variability was found characteristic only for the shoulder length index and was - 30.7±3.01 cm, the forearm index - 26.8±1.47 cm, and the brush value is - 20.7±0.52 cm. From the latitudinal sizes, similar indicators

with players of other playing roles were revealed for shoulder width - 42.8±1.6 and pelvic width - 31±1.55 cm. The mid-chest transverse and mid-chest sagittal indicators are characterized by lower values, which, apparently, is associated with the specifics of gaming activity - 29.2±2.04, and 18.7±1.75, respectively. The thickness of the fat folds is within the normal range.

Total sizes of the central: the body length is - 176.6±6.5 cm, body weight - 72.3±2.3, chest circumference - 91.3±2.7. The variability of body length by the value of the sigma deviation is characteristic of the center and the process of body length growth has not yet been completed. The central's weight was 72.3±2.9 kg, chest circumference - 91.3±2.7 cm. It should be noted that in terms of chest circumference, the centers are ahead of the handball players of other playing roles.

Partial sizes: Of the long-length sizes, the shoulder length remains the most stable, the value of which is - 30±4.12 cm. But the length of the forearm and hand is shorter than that of other players and their values are 26.8±1.46 and 20.7±1.11. Regarding the segments of the lower extremities - the length of the thigh is - 47.6±3.82, the lower leg - 44.6±2.76, the length of the foot is shorter than that of other players - 41.8±1.21. The circumference sizes of the centrals also have their own characteristics. Thus, the shoulder girth is higher in comparison with handball players of other playing roles and is 32.7±1.11, the forearm is 28.1±0.69, the hip girth is significantly lower and has a value of - 54.8±2.85 cm, the shin girth was - 36.7±1.8. The latitudinal sizes are generally inferior to the indicators of handball players of other types of playing roles. So the width of the shoulders has an indicator equal to 41.8±2.48 cm, the size of the mid-chest transverse was 28.8±1.77; the mid-chest sagittal was 19.7±1.38 cm and finally the width of the pelvis is 29.9±1.07 cm. The thickness of the fat folds corresponds to the norm.

Conclusion

Assessment of the physical development of handball players tends to increase in total size as the level of sports qualification increases. The average body length of the leading players is 180-181 cm. However, given that the handball players we are examining are young, there is a high probability that the growth processes have not yet been completed. The body mass index shows variability, since the mean square deviation has a high value δ=10.42. Moderate variability was detected in such an indicator as chest circumference and the sigma deviation was - δ= 5.74, chest circumference in handball players averaged - 97.4±5.74cm. Medium-sized and undersized in handball - center and extreme forwards, so low growth provides high -speed qualities and agility. The asymmetry of the arm is characteristic of the "throwing" arm and the "pushing" leg. The predominant somatotype for handball players is the ecto-mesomorphic type, since there is a predominance of weight-growth indicators and muscle component.

References

Akramov J.A. (2008) *Gandbol* [Handball]. Textbook "Leader Press", Tashkent, (in Uzbek).

Abdurahmanov F.A., Karieva R.R. (2008) Optimizaciya nagruzok razlichnoj napravlennosti v mezhgruppovyh ciklah sorevnovatel'nogo perioda gandbolistov vysokoj kvalifikacii [Optimization of loads of various orientation in the intergroup cycles of the competitive period of highly qualified handball players]. *Fan-sportga [Science to sports],* **2,** 42-48 (in Russian).

Ignateva V.Ya., Thorev V.I, Petracheva I.V. (2005) *Podgotovka gandbolistov na etape visshego sportivnogo masterstva* [Training of handball players at the stage of higher sports skill]. Moscow, Fizicheskaya kultura (in Russian).

Ignateva V.Ya. (2015) Testovye zadaniya dlya kontrolya fizicheskoj podgotovlennosti gandbolistov vysokoj kvalifikacii [Test tasks for monitoring the physical fitness of highly qualified handball players]. *Teoriya i praktika fizicheskoj kul'tury [Theory and practice of physical culture],* **2,** 66-69 (in Russian).

Borisov E.L., Ratianidze A.L., Tuzikov A.A. (2013) *Metodicheskie osnovy trenirovochnogo processa po gandbolu* [Methodological foundations of the handball training process]. textbook. Moscow, (in Russian).

Eremin A.V. (2019) *Programma po sportivnoj podgotovke po vidu sporta Gandbol* [Sports training program in handball]. textbook. Moscow, (in Russian).

Nabiev T.E. (2020) *Organizaciya i sudejstvo sorevnovanij po gandbolu* [Organization and refereeing of handball competitions]. textbook. Tashkent, (in Russian).

Pavlov Sh.K., Abdurahmanov F.A., Akramov J.A. (2006) *Gandbol* [Handball]. Textbook, "UZDZHTI nashriyoti". Tashkent (in Uzbek).

Pavlov Sh.K., Abdurahmanov F.A. (2006) Podgotovka gandbolistov [Training of handball players]. Text-

book, “UZDZHTI nashriyoti”. Tashkent (in Russian).

Chetverikov A.S., Nemicheva N.A., Solodkov A.S., et al. (2019) *Programma sportivnoj podgotovki po vidu sporta “Gandbol”* [The program of sports training in the sport “Handball”]. Stavropol (in Russian).

AUTHOR BIOGRAPHY



Shuhrat Furkatjanovich TULAGANOV

Employment

Head of the Department of Theory and methodology of handball and rugby, Assistant Professor at Uzbekistan state university of physical education and sport.

Degree

MD

Research interests

Sport Science, Physical Education, Theory and methodology of handball.

E-mail: shuha.87.12@gmail.com