MODELLING ANTHROPOMETRY OF TENNIS PLAYERS (AGE 17-18-YEARS)

Rumiana Karapetrova, Georgi Stoykov, Stefan Stoykov
National Sports Academy "Vassil Levski"

Summary: Tennis is complex sport demanding serious requirements towards the complex development of the player and his training process, including his anthropometry. Everyone who starts to practice tennis goes on the way of the best players. The focus is on their anthropometric, physical and technical abilities. Compliance with this is a guarantee of well-planned selection and training process – guaranteeing a complete sport realization afterwards. The aim of the study is to model the anthropometry of tennis players in the age period 17-18 years. The subject of the study are 30 Bulgarian players (age 17-18 years), ranked among the top 35 in the National rank list. For the purpose of the study are analyzed 14 anthropometry indexes. Results variance suggests that respondents group is homogeneous. All studied indexes are above the average values for this age group in Bulgaria except the weight. On the basis of this analysis we propose a normative table for assessing the level of development of each anthropometric indexes. We recommend as a leading index to differentiate height and weight. Comparing the data of respective training player with those of the elite Bulgarian players in his age group helps us determine the level of development of his anthropometric signs. The proposed evaluation tables provide the opportunity to differentiate the most talented for tennis.

Key words: tennis, anthropometry, modelling, physical abilities

Introduction

Tennis is complex sport demanding serious requirements towards the complex development of the player and his training process, including his anthropometry.

Everyone who starts to practice tennis goes on the way of the best players. The focus is on their anthropometric, physical and technical abilities. Compliance with this is a guarantee of well-planned selection and training process – guaranteeing a complete sport realization afterwards.

Sport selection sets the start of organized sport activities. Some specialists (Shestakov, M, A. Nazarov, I. Mironenko, M. Baibah, H. Jumarov, B. Veshekidze, E. Nazadze – 1989) define it as the most difficult part of the sport theory and methodology.

For M. Buchvarov (2004) the medical and biological characteristics – as height, weight, body structure, functional capacity of cardiovascular system, state of the analyzers – are good prerequisite for “initial selection of candidates for organized sport activities”, as well as the selection – selection in the process of preliminary and initial training process”.

Wrong selection leads to loss of time for training, traumatization of psyche of young athletes – in practice this is bad promotion of sport itself and for the high-performance sport (Siris, P., P. Gaydarska, Kr. Rachev, 1983; St. Stoykov, 2007).

Great number of sport specialists and coaches examining the problems of sport selection find anthropometrical indexes as height, upper and lower limbs measurements, torso length, chest circumference, shoulder diameter, weight and etc. as such of great importance (Bril, M. 1980; Gujalovskiy, A. 1986; Dorohov, R., V. Guba, V. Petruhin, 1994; Karapetrova, R. 2009; Mos, V. 1976; Penchev, A. 1986; Stoykov, G. 2012; Hem, I. 1976; Durand, P. 1987; Merhautova, I., M. Maček 1966).

Very often in sport practice children who are not noticeable at first glance are overlook at the expense of the children with accelerated growth, with premature development of both anthropometric and motor abilities (Zelenichonok, V., V. Nikityoushin, V. Guba, 2000). Subsequently, it turned out that the first were the future champions. The same authors form the following positions of the sport selection:

1. It is multi-stage process, for long-term period, covering all aspects of the sport training.
2. It is based on the comprehensive study of the capabilities of athletes.
3. Its objectives are to create the most favorable prerequisites for the formation of these abilities as well as their refinement in the chosen sport.

Tz. Jeliazkov (1998) identifies the three main scientific and methodological problems of the sport selection:

1. Morpho-anatomic signs and indicators of

the health status.

2. Motor abilities – characterizing the genetic capacity of motor and vegetative functions.
3. Psychological signs – intellectual, emotional, etc. Components of the mental status.

Modelling as a main tool for controlling and managing the training process is a way to give more specific attention to the problem of sport selection (Kuznetsov, V. 1975; M. Buchvarov, 1991).

In our case, we apply modeling to develop models regarding anthropometric characteristics of young tennis players at certain stage of their development – the age period 17-18-years.

Aim and Objectives of the study

The aim of the study is to model the anthropometry of tennis players in the age period 17-18 years. The subject of the study are 30 Bulgarian players (age 17-18 years), ranked among the top 35 in the National rank list.

Methods

For the purpose of the study are analyzed 14 anthropometry indexes (see Table 1). All gathered research data was analyzed using variance analysis (applying SPSS computer software). Based on the results of the variance analysis, using signal method we developed evaluation tables for assessment of anthropometric indexes.

Table 1
Anthropometric indexes.

signature	name of the index	measured in:	accuracy
X1	Height	cm	1
X2	Weight	kg	1
X3	Upper limbs combined length	cm	1
X4	Upper limb length	cm	1
X5	Armpit length	cm	1
X6	Forearm length	cm	1
X7	Lower limb length	cm	1
X8	Thigh length	cm	1
X9	Shank length	cm	1
X10	Torso length	cm	1
X11	Foot length	cm	1
X12	Shoulder diameter	cm	1
X13	Playing armpit circumference	cm	1
X14	Non-playing armpit circumference	cm	1

Explanation: The length of the forearm includes the length of the hand; the length of the shank includes the length of the foot.

Results analysis

Table 2 presents the variance analysis of the research data for the age period 17-18-years.

Table 2
Variance analysis.

signature	X	±Mx	S	Ex	As	R	Min	Max	N	V%
X1	180,92	0,64	3,12	-0,51	-0,56	12	174	186	24	1,72
X2	72,29	0,92	4,51	0	0,12	18	63	81	24	6,23
X3	182,29	0,94	4,59	1,13	1	18	177	195	24	2,52
X4	80,88	0,49	2,38	-1,3	-0,11	7	77	84	24	2,95
X5	33,96	0,29	1,43	-1,34	-0,02	4	30	37	24	4,47
X6	48,67	0,55	2,68	0,6	-0,75	12	42	54	24	5,51
X7	103,79	0,47	2,32	-0,87	0,07	8	100	108	24	2,24
X8	47,96	0,48	2,33	-0,49	0,3	9	44	53	24	4,86
X9	55,79	0,58	2,83	1,08	-1,33	13	47	60	24	5,07
X10	55,54	0,51	2,52	2,25	1,17	10	52	62	24	4,54
X11	29,54	0,07	0,33	-0,42	-0,08	1	29	30	24	1,11
X12	44,38	0,31	1,5	1,14	0,73	7	41	48	24	3,38
X13	29,33	0,37	1,83	-0,19	-0,26	7	25	32	24	6,25
X14	27,54	0,38	1,86	-1,09	-0,18	6	24	30	24	6,77

The height (X1) has average value of 180,92 cm, with relatively wide range (R) – Xmin is 174 cm, and Xmax – 186 cm. The results show higher level compared to the average values for this age period in Bulgaria.

Weight (X2) vary between 63 and 81 kg (average values is 72,29 kg).

Upper limbs combined length (X3) has average value slightly above the average height (178,63 cm), ranging from 157 to 186 cm.

The length of the upper limb (X4), armpit (X5) and forearm (X6) show values that can only be ascertained, due to the fact that we do not have similar data and age period to compare with. The same is valid for the lower limb length (X7), thigh (X8) and shank (X9).

The torso length (X10) has average value of 55,54 cm, ranging from 52 cm to 62 cm.

The respondents foot length (X11) varies between

29 and 30 cm, with average value of 29,54 cm.

The shoulder diameter (X12) has wide range from 41 cm to 48 cm, average value is 44,38 cm.

High circumference we find in the playing armpit (X13) compared to the non-playing armpit (X14) – 29,33 cm vs. 27,54 cm.

Results variance suggests that respondents group is homogeneous. All studied indexes are above the average values for this age group in Bulgaria except the weight.

On the basis of this analysis we propose a normative table for assessing the level of development of each anthropometric index. We recommend as leading indexes to differentiate height and weight.

The numerical and verbal expression of the assessment is as follows: very high (6), high (5), good (4), average (3) and below average (2).

Table 3
Studied indexes assessment table.

index	2	3	4	5	6
Height (cm)	under 175	175 - 177	178 - 183	184 - 187	over 187
Weight (kg)	under 63	63 - 67	68 - 76	77 - 81	over 81
Upper limbs combined length (cm)	under 173	173 - 177	178 - 186	187 - 191	over 191
Upper limb length (cm)	under 76	76 - 77	78 - 84	85 - 86	over 86
Armpit length (cm)	under 29	29 - 30	31 - 33	34 - 35	over 35
Forearm length (cm)	under 43	43 - 45	46 - 51	52 - 54	over 54
Lower limb length (cm)	under 99	99 - 100	101 - 106	107 - 108	over 108
Thigh length (cm)	under 43	43 - 45	46 - 50	51 - 53	over 53
Shank length (cm)	under 50	50 - 52	53 - 58	59 - 61	over 61
Torso length (cm)	under 51	51 - 52	53 - 57	58 - 61	over 61
Foot length (cm)	under 29	29 - 29,5	30 - 30,5	30,5 - 31	over 31
Shoulder diameter (cm)	under 41	41 - 42	43 - 45	46 - 47	over 47
Playing armpit circumference (cm)	under 26	26 - 27	28 - 30	31 - 32	over 33
Non-playing armpit circumference (cm)	under 24	24 - 25	26 - 28	29 - 30	over 31

Conclusion

Comparing the data of respective training player with those of the elite Bulgarian players in his age group helps us determine the level of development of his anthropometric signs. The proposed evaluation tables provide the opportunity to differentiate the most talented for tennis.

Subsequent findings based on study results can be

a basis for making adjustments to the construction and planning of the training process.

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Author information:

Senior lecturer Rumyana Karapetrova, PhD, National Sports Academy "Vassil Levski", Department "Track & Field"

Address: Sofia, Bulgaria, ZIP 1700, "Studentski gard", NSA "Vassil Levski", (Department "Track & Field")

Mobile +359 892 299 866, e-mail: rumyanakar@abv.bg