Pol. J. Appl. Sci., **2019**, *5*, 21-25

THE SOMATIC BUILD VERSUS THE SPORTS RESULT OF BOYS AGED 12 TRAINING TENNIS IN PODLASKIE VOIEVODOSHIP

Aleksandra Durzyńska, Kacper Łebkowski, Anna Białobrzewska, Monika Jemielity, Tomasz Waldziński

Lomza State University of Applied Science

E-mail: adurzynska@pwsip.edu.pl

Abstract

Introduction: The physical efficiency and effectiveness of the educational process in many sports discipline essentially depends on the somatic build of an athlete, and it is frequently the most substantial selection criterion of competitors in a professional sport. In many sports disciplines and competitions the physique of competitors often determines the final results. The somatic build of tennis players is a supporting factor which can cause competitors to achieve the highest results.
The aim of the study was the assessmentof the somatic build and defining its correlationwith the sports results of male tennis players aged 12.
Material and method: The research was carried out on a group of 19 male tennis players aged 12. To estimate the somatic build of tennis players the basic parameters were used: the height, the bodyweight, the water content and the body fat index. In the research the results of the tennis tournament (a group system), which was performed according to the Polish Tennis Union, were analysed.
The results: The correlation analysis, which was carried out based on the results of percentage of the content of the adipose tissue and the tennis tournament results showed that there is a statistically significant correlationbetween the results. However, there was not any connections between the results of the bodyweight and the body height and the percentage of the water content in the organism versus the tennis tournament results.
Conclusion: The results of research demonstrate the need to conduct current, operational and phased controls taking into account a bigger group of training, which would create the possibilityto define the correlation between the style of playing and the sports results in searching for directions to optimise the training process.

Key words: tennis, somatic build, sports result.

DOI: 10.19260/PJAS.2019.5.2.04

Introduction

It has been observed that the dynamic development of professional sport has caused sufficient differences between the results of an average sportsman and the results gained by record-breakers in recent years. Those who practise professional sport have to fulfil the physical requirements of a particular discipline they practice which includes their motor abilities, psychological condition and their somatic build [1–3].

The differentiation in the physique of people practicing a sport was already observed in ancient Greece. Filostratus Flavius described what physique the competitors should have in order to be able to win in a particular sport. In the Olympic Games athletes used to qualify for groups in the competition based on their somatic build [4].

In modern times the first and wide-ranging source of information based on strict observations referring to the physique of competitors dates back to the previous century. The first classification of somatic sports types was carried out by W. Kochlrausch in 1921 [5].

Kochanowicz [6], Drozdowski [7], Płatonow [8], Sawczyn [9], Jagiełło [10] and others think that physical efficiency and the effectiveness of the educational process in many sports disciplines essentially depend on the somatic build of an athlete, and it is frequently the major selection criterion of competitors in a professional sport.

In many sports disciplines and competitions the physique of competitors often determines the final success. A dozen of contemporary researchers and trainers anticipate sport results on the base of features of the physique, morphological condition and somatic development [11].

In the opinion of Ważnego [12], Zaporożanowa [13], Sozańskiego [14], Raczka [15], Klimczyka [16] and others the physique of a competitor is not substantial and is not the only factor which impacts the level of sports results, but it is one of the essential elements which determines the process of development of the sports' level.

Analysing different features of physical development of competitors who are at a different level in tennis KrĂłlak [16], Ziemann [17], Elce et.al. [18] claim that the height, bodyweight and body composition have the most influence on sports result. Ziemann and Garsztka focus on the slightly or distinctly accelerating biological development in terms of the calendar age of the top Polish contestants aged 15 – 18. They also assert that sport championship increases together with a lean bodyweight [19].

The somatic build of tennis players is a supporting factor, so that competitors can achieve the highest sports results. The rectangular shape, the size of the tennis court, the height of net lead to tall, strong and well– built tennis players having an advantage in mastering an effective serve, smash and often volley. The advantage of the arm span in the area of attack makes singles and doubles easier for tall competitors. Besides, tall tennis players are more effective in offensive and defensive actions and more active when they play from the back court. It indicates that the factor of the height of a human body is one of the elements which determines the best results in tennis and the style of playing of a participant [20–23].

The aim of the research was the assessment of the somatic build and defining its dependence with the sports result of male tennis players aged 12 who are training in sports clubs in Podlaskie Voivodeship.

The material and the research methods

The research was carried out in a group of 19 male tennis players aged 12 training in sports clubs in Podlaskie Voivodeship.

To estimate the somatic build of tennis players the basic parameters were used: height, bodyweight, water content, and body fat index.

The information referring to the body height and the bodyweight was gathered by the direct measurement using a medical weight with a measuring rod and BMI indicators were counted on their basis.

The percentage of the body fat index and the water content in the playerwas defined with the help of the weight TANITA BC 1 000.

In the research the results of the tennis tournament (a group system), which was performed according to the Polish Tennis Union, were analysed.

In the final classification the tested players were ranked according to their result from 1 to 16.

The gathering results were analysed using the statistic packet called STATISTICA version 7.0 by StatSoft firm. The variables being nominal features were described creating the distributive ranks in which there were distinguished options of qualities giving their numbers and frequency of occurring in the entire examined community. The variables being quantitative features were characterized with the help of value of the descriptive statistics: the arithmetic mean (x) – the average level of the variable and the standard of deviation (SD) – the measurement of "average" deviation results from the average value and the maximum and minimum value.

To determine the correlation between variables describing coordinative, conditional abilities and special effectiveness of the examined competitors, Pearson line correlation coefficient r(X,Y)was calculated, where as a t-Student test determines, which correlations are the most statistically significant. The correlation coefficient takes value from the interval $< -1.1 >$, and it relates to the strength and the type of correlation between variabilities. On the basis of the gained values of Pearson line correlation coefficient, the strength of stated correlations is usually classified according to the below juxtaposition: $r(X,Y) = 0$ lack of correlation
$0 < |r(X,Y)| < 0.1$ little correlation
$0.1 <= |r(X,Y)| < 0.3$ faint correlation
$0.3 <= |(X,Y)| < 0.5$ average correlation
$0.5 <= |(X,Y)| < 0.7$ high correlation
$0.7 < |(X,Y)| < 0.9$ very high correlation
$0.9 < |(X,Y)| < 1$ almost full correlation
$r(X,Y) = 1$ full correlation (functional dependence) in which, the symbol $|r(X,Y)|$ means absolute value calculated from Person line correlation coefficient.

The results of research

Table 1: The results of measurement of parameters of somatic built

Tennis players aged 12	Means	Minimum	Maximum	Standard of deviation
Bodyweight	44.51	34.00	55.80	5.14
Body height	157.13	143.00	167.00	6.20
Content of water (%)	60.03	52.00	63.90	3.76
Content of fatty tissue(%)	10.82	7.00	14.50	2.16

The analysis of the results of research of parameters of the somatic build defined on the basis of direct measurement demonstrated differentiation of values of tested tennis players.

The bodyweight of male tennis players aged 12 ranged at the level 34.00 – 55.80 kg, and a means value was 44.51 kg. The tallest male tennis player was 167 cm, and the shortest one was 143 cm tall. However, the mean value of the height of a competitor was 157.13 cm. the water content in the organism ranged at the level 52.00 – 63.90%,and

the mean value was 60.03%. The percentage content of the adipose tissue in the organism of boys aged 12 ranged between 7.00 and 14.50%, and the percentage mean value of the adipose tissue was 10.82%.

Table 2: value of BMI of the tested group

Level	Number
UNDERWEIGHT	2
NORMAL	10
OVERWEIGHT	3
OBESE	1
Total	16

For the predominant part of the examined group consisting of 10 male tennis players the level of BMI was classified as a normal. Two male tennis players were marked underweight, three competitors were overweight, and one tennis player was obese.

Table 3: Dependence between the somatic build and the result in a group of male tennis players aged 12

Bodyweight	-0.404
	p=0.498
Body height	-0.069
	p= 0.955
% water content	0.407
	P=0.495
% content of the adipose of tissue	0.642
	P=0.045

The correlation analysis, which was carried out between the results of percentage of the content of the adipose tissue and the results in the tennis tournament showed there is statistically significant dependence between the results of research. The correlation at the level 0.642. However, there was no correlation connections between the results of the body weight and the body height and the percentage of the water content in the organism versus the results in the tennis tournament.

Discussion

M. Skład, M. Kędzierska [24], T. Łaska–Mierzejewska [25] emphasised that physique plays the most important role in a sport. They confirm the type of physique is a biological characteristic and highly genetic condition, which is unchangeable during a person's life. Therefore, the physique of child tennis players should be taken into account because it gives them a lot of chances to fulfill the somatic criteria of discipline they have chosen.

The specificity of tennis and sport training associated with it require physical and psychical predisposition from competitors. In the opinion of Juśkiewicz [26] the physique differential of contestants impacts the style of play. The tennis players who dominate serve and volley play have larger legs, a first strong serve, smash and excellent volley. However, competitors with long upper limbs prefer to play from the back court.

The root cause of differences playing on the court can be found in the technical – tactical process of youth training of a tennis player. Unierzyckiand Schefke [27] claim that the stage of biological maturity of a competitor has an influence on the sports result when young people practice tennis.

Ziemann and Garsztka [18] indicate the variability of development of morphological features on the basis of the references and their own extensiveresearchcarried out on competitors aged 15 – 19 who were qualified for the educational programme of the Polish Tennis Union. They highlight the quicker development of the indicator of the body height of young tennis players in relation to their bodyweight and a contrary tendency in a group of male tennis players aged 16 – 17. They emphasize the oldest contestants characterized the highest lean bodyweight, and the youngest had the lowest, and the indicator showed significant dependence within the level. Tennis players with higher lean bodyweight were found to achieve better places on the ranking lists ITF.

Research of E. Ziemann and T. Garsztki [19] demonstrate that in a group of male tennis players, the height of the body ranged between 165 and 193 cm and the mean value is 175 cm and standard deviation is 7.4. The minimal value of BMI was 17.4, maximal 22.8 and mean value 20.1 and standard deviation was 1.4.

In the world leaders, a big differential in the height of the body of tennis players has been observed. In a group of male tennis players the height of the world-class competitors ranged between 180 and 188 cm, and they have ecto–mesomorphphysique [28–30]. Żurek [2013], who has a similar opinion, carried out research referring to the somatic build and the componentsof the body weight of the top Polish tennis players aged 15 – 17. The height of all tested participants was 178.6 cm, the bodyweight 66.2 kg, but the content of adipose tissue was at the level of 9.1%. The author showed essential dependences between the height of

the examined leading Polish tennis players and special effectiveness and the place they took in the sports league table. On the basis of his observations it is necessary to state that the assessment of the physique, its particular components, and mutual connections between them provide vital factors in the process of chosen candidates and identification of their talents [31].

Kibler et.al. (1988) in their research defined the amount of body fat index in young participants aged 14 – 19 training professional tennis at the level 16 – 22%. A similar percentage value of adipose tissue in boys 19–21% was noted in research by Bergeron 1991, Konvacs 2007. The value 12% was noted in a group of competitors playing at the highest level. The above-mentioned authors determined that bodyweight and height play a crucial role, and they are factors which determine the sports level in tennis. A player is forced to react fast and precisely for constantly changing stimuli like: the distance, the height, quickness and weather conditions. A tennis match can last even for several hours. The specificity of the game, training and numerous journeys associated with it require from competitors varied predispositions, psychological and physical abilities. The somatic build of participants is admittedly a factor which helps achieve the highest sports results, because a rectangular shape, the size of the court, the height of the net make that tall, strong and proportionally built tennis players possess an advantage of mastering an effective serve, smash and frequently volley. The advantage of the arm span in the attack zone makes tall competitors either play singles or doubles easier. Tall tennis participants are more effective in offensive and defensive actions and more active playing from the court back. The factor of the height of a body indicates that it is one of the element which determines achievement of the best results in tennis [16, 21, 22, 27, 32, 33].

The male tennis players aged 12 from the Student Sports Club "Return" Łomża characterized slightly higher mean of height. It was 157.13cm.

The height of young sportsmen's bodies is referenced to a seven point scale focusing on qualitative assessment of somatic build H. Milicerowej [5] according to the criteria: very tall, tall, above medium, medium, below medium, small, and very small; it oscillates at the level above medium.

A well–known American trainer Nick Bollettieri [34,35] suggests that on the basis of height it is necessary to determine the style of playing, tactics for competitors, so that they could achieve a championship level.

Analysing the value of index BMX, diversity of the results of the research of the somatic build is recognised. However, ten out of sixteen tested players were within the normal level.

However, the correlation analyse which occurs between the percentage results of the content of fatty tissue in the organism and the results of tennis tournament showed statistically sufficient dependences at the level 0.642.

Conclusions

1. Among the tested tennis male players the substantial diversification of the tested indicators of the somatic build was noted.
2. There are no unambiguous proposals of the type of the somatic build for players training tennis in the Student Sports Club "Return" Łomża.
3. The correlation research between the percentage dependences of the adipose tissue in the organism and the tennis tournament results showed that there are statistically significant dependences at the level 0.642 (low body fat index makes players achieve better results in tennis tournaments).
4. The results of research demonstrate the need to conduct current, operational and phased controls taking into account a bigger group of training, which allows the dependence between the style of playing and the sports results in searching for directions to optimise the training process to be defined.

Literature

[1] Sozański H. *Podstawy teorii treningu sportowego.* Centralny Ośrodek Sportu, 1999.

[2] Wilmore JH, Costill DL. Age and sex considerations in sport and exercise. *Physiology of Sport and Exercise. 3th ed. Champaing IL: Human Kinetics*, pages 512–537, 2004.

[3] Kozłowski S. Granice przystosowania. *Wiedza powszechna*, Warszawa, 1986.

[4] Wroczyński R. *Powszechne dzieje wychowania fizycznego i sportu.* Ossolineum, Wrocław, 1979.

[5] Milcerowa H. Problemy antropologii w wychowaniu fizycznym i sporcie. *Wychowanie Fizyczne i Sport*, 13(3):3–21, 1969.

[6] Kochanowicz K. *Podstawy kierowania procesem szkolenia sportowego w gimnastyce.* AWFiS, Gdańsk, 2006.

[7] Drozdowski Z. *Antropologia sportowa. Morfologiczne podstawy wychowania fizycznego i sportu.* AWF Poznań, 1984.

[8] Płatonow WN. Obszczaja tieorija podgotowki sportsmienow w olimpijskom sportie. *Olimpijskaja Literatura*, Kijew, 1997.

[9] Sawczyn S. *Podstawy kontroli obciążeń treningowych w gimnastyce sportowej.* AWFiS, Gdańsk, 2008.

[10] Jagiełło M. *Somatic changes in polish representatives of tennis in the annual training period.* Warszawa AWF, 2004.

[11] Jaskólski E., Wołkow L., Jagiełło W. *Biologiczne i pedagogiczne podstawy systemu szkolenia sportowego.* Centralny Ośrodek Sportu, 2005.

[12] Ważny Z. Związek między budowa somatyczną a sprawnością w wybranych konkurencjach lekkoatletycznych. *Wychowanie Fizyczne i Sport.*, 7(4):429–445, 1963.

[13] Zaporożanow W., Sozański H. *Dobór i kwalifikacja do sportu.* COS RCM–SzKFiS, 1997.

[14] Raczek J. *Antropomotoryka. Teoria motoryczności człowieka w zarysie.* PZWL, Warszawa, 2010.

[15] Klimczyk M. *Kierowanie i kontrola szkolenia sportowego tyczkarzy na etapach – wstępnym i podstawowym.* Uniwersytet Kazimierza Wielkiego, Bydgoszcz, 2008.

[16] Królak A. *Tenis dla dzieci, nauczycieli i rodziców.* Wydawnictwo Szkolne i Pedagogiczne, Warszawa, 1999.

[17] Ziemann E. Effects of tennis training on aerobic and anaerobic capacity in young tennis players – comparison boys and girls. *The Official Journal of Jędrzej śniadecki Academy of Physical Education and Sport.*, 12(1):97–100, 2006.

[18] Elce A., Cardillo G., Ventriglia M., Giordano C. et al. Anthropometric characteristics of young italian tennis players. *Journak of Human Sport and Exercise*, 12(3):651–658, 2017.

[19] Ziemann E., Garsztka T. *Wydolność i sprawność fizyczna tenisistów w wieku rozwojowym.* Gdańsk: AWFiS, 2010.

[20] Królak A. *Tenis – technika, psychomotoryka, trening.* Warszawa: COS, 1998.

[21] Crespo Miley D. *Podręcznik wzorowego trenera.* Katowice: ITF; Wydawnictwo Piętka, 1998.

[22] Deniau G. *Tenis.* Wrocław: Zakład Narodowy imienia Ossolińskich, 1991.

[23] Sanchis–Moysi J., Idoate F., Alamo–Arce D. et al. The core musculature in male prepubescent tennis players and untrained counterparts: a volumetric mri study. *J Sport Sci*, 30:1–7, 2016.

[24] Skład M., Kędzierska M. *Wybrane problemy doboru i selekcji w sporcie, cz. 1*, chapter Ocena somatyczna startujących w Ogólnopolskiej Spartakiadzie Młodzieży w Poznaniu w 1984 roku na przykładzie niektórych dyscyplin sportu., pages 161–252. Warszawa: Instytut Sportu.

[25] Łaska Mierzejewska T. *Antropologia w sporcie i wychowaniu fizycznym.* Warszawa: COS, 1999.

[26] Juśkiewicz K. Styl gry tenisistów odzwierciedleniem indywidualnych cech i predyspozycji. *Trening*, pages 85–96, 1997.

[27] Unierzycki P., Schefke T. *Teoria i metodyka nauczania tenisa.* Poznań: Pracownia Tenisa, AWF, 2000.

[28] Kovacs MS. Tennis physiology, training the competitive athlete. *Sports Med*, 37(3):189–198, 2007.

[29] Sanchez-Munoz C., Sanz D., Zabala M. Antropometric characteristisc, body composition and somatotype of elite tennis players. *Br J Sports Med*, 41:793–799, 2007.

[30] Schönborn R. Advanced techniques for competitive tennis. *A: Meyer und Meyer Sport.*, 1999.

[31] Żurek P. *Somatyczne, kondycyjne i koordynacyjne uwarunkowania sprawności specjalnej tenisistów na etapie treningu ukierunkowanego.* Poznań: AWF, 2013.

[32] Kibler W., Mc Queen C., Uhl T. Fitness evaluations and fitness findings in compertitive junior tennis players. *Clin Sport Med*, 7(2):403–416, 1988.

[33] Bergeron MF, Maresh CM, Kraemer WJ, Abraham A, Conroy B, and Gabaree C. Tennis: a physologival profile during match play. *International Jurnal of Sports Medicine*, 12:474–479, 1991.

[34] Bollettieri N. Return of serve – my opinion. *ITF Coaches Review*, 6, 1995.

[35] Bollettieri N. Dziesięć czynników niezbędnych do osiągnięcia sukcesu w tenisie. In *Materiały szkoleniowe VII Konferencja Polskiego Stowarzyszenia Trenerów Tenisa.*, 13th–15th December 2002 , Pruszków: Poland.

Received: 2020
Accepted: 2020