

Somatic aspects of sports championship in taekwon-do ITF

Jagiello Wladyslaw¹, Kozina Zh.L.², Jagiello Marina¹

¹University of Physical Education and Sport, Gdansk, Poland

²Kharkov National Pedagogical University, Ukraine

Abstract:

The purpose of the study is to answer a basic question: which somatic characteristics of taekwon-do ITF athletes correlate the most with their sports level and experience training. **Material:** Representatives of the Polish taekwon-do ITF national team (n=21) took part in the study. The subjects' age was in the range of 18.51–32.22 years (24.5±4.1), and their training experience 8.4–22.4 years (13.6±3.4). **Results:** Measurements of 20 basic somatic characteristics were taken. It was determined that correlations with the sports level and training experience were non-homogeneous and diverse due to the represented weight category. **Conclusions:** correlations of somatic indices with sports level and training experience among Polish representatives in taekwon-do are heterogeneous and largely dependent on weight category.

Ягелло Владислав, Козина Ж.Л., Ягелло Марина. Соматические аспекты спортивного мастерства в тээквондо ITF. Цель исследования – установить, какие из соматических показателей высококвалифицированных борцов в наибольшей степени коррелируют со спортивным уровнем и тренировочным стажем спортсменов. **Материал:** В исследованиях приняли участие члены сборной команды Польши по тээквондо ITF (n=21). Возраст мужчин находился в диапазоне 18,51-32,22 лет (24,5±4,1), а тренировочный стаж 8,4-22,4 лет (13,6±3,4). Проведено измерение 20 основных соматических показателей. **Результаты:** Установлено, что их взаимосвязи с уровнем спортивного мастерства и тренировочным стажем спортсменов являются неоднородными и дифференцируются по весовым категориям. **Выводы:** корреляции соматических показателей со спортивным уровнем и опытом обучения среди польских представителей тээквондо неоднородны и в значительной степени зависят от весовой категории.

Ягелло Владислав, Козина Ж.Л., Ягелло Марина. Соматичні аспекти спортивної майстерності в тэеквондо ITF. Мета дослідження - встановити, які з соматичних показників висококваліфікованих борців найбільшою мірою корелюють зі спортивним рівнем і тренувальним стажем спортсменів. **Матеріал:** У дослідженнях взяли участь члени збірної команди Польщі з тэеквондо ITF (n = 21). Вік чоловіків знаходився в діапазоні 18,51-32,22 років (24,5 ± 4,1), а тренувальний стаж 8,4-22,4 років (13,6 ± 3,4). Проведено вимірювання 20 основних соматичних показників. **Результати:** Встановлено, що їх взаємозв'язку з рівнем спортивної майстерності та тренувальним стажем спортсменів є неоднорідними і диференціюються по вагових категоріях. **Висновки:** кореляції соматичних показників зі спортивним рівнем і досвідом навчання серед польських представників тэеквондо неоднорідні і в значній мірі залежать від вагової категорії.

Keywords:

taekwon-do, ITF, body, composition, sports, championship.

тэеквондо, ITF, строение, тела, спорт, мастерство.

тэеквондо, ITF, будова, тіла, спорт, майстерність.

Introduction

Modern sport theorists and practitioners' research clearly indicates correlations between athletes' somatic composition and the represented by them sports discipline [7, 8, 11, 16].

In most cyclical disciplines of sport and team sports games, morphological indicators constitute the basic criterion for recruitment and selection. In many cases, they define the efficiency of the competitive activity and, what is directly connected with this, the level of sports championship [1, 6, 10, 17].

However, the problem is much more complex in speed-strength sports with a complicated coordination structure and a large range of body weight. Taekwon-do ITF undoubtedly meets these conditions [3, 18, 20].

Therefore, the purpose of the research is to answer a basic question: which somatic characteristics of taekwon-do ITF athletes correlate with the sports level and training experience to the greatest extent.

Material and methods

The study involved taekwon-do ITF athletes (n=21). Among them 14 were representatives of Poland in senior category. The remaining subjects represented a high sports level. The subjects' age ranged between 18.51 and 32.22 years (24.5±4.1), body weight varied within 62.70–100 kg (75.3±10.3), and the body height 167.0–195 cm (179.6±8.3). The sports level was determined on the basis of experts' opinions (coaches of the Polish national team in Taekwon-do ITF) by means of ranking.

The training experience varied between 8.4 and 22.4 years (13.6±3.4) and was significantly varied (V%=24.8). Anthropometric measurements were taken during the Polish national team camp trainings (Spala – Central Sport Centre, February 29–March 5, 2012) and during Seniors and Juniors Polish Cup competitions (Klobuck, 2-4 February 2012).

Anthropometric measurements were taken in accordance with the adopted rules [4], using standard instruments. In addition, five indicators were calculated: slenderness, Rohrer's, Quetelet's II. Manouvrier's, and the shoulder-pelvis index.

The total body fat in percentage from body weight was calculated according to Brożek and Keks's equation [2]. The density of body, on the basis of measurements of subcutaneous fat, was calculated by Piechaczek's anticipating equation [19]. Measurements of total of 20 basic somatic characteristics were made.

The results of the study were then subjected to basic statistical analysis by calculating the arithmetic mean (X), the standard deviation (±SD), the coefficient of variation (V%) and the level of correlations (r).

Results

Correlations of somatic characteristics with training experience (TE) and sports level (SL) among taekwon-do athletes show a varied character (Tab. 1).

Taking into account mean value of all the correlations, they are slightly higher in relation to the training experience than to the sports level (0.439 and 0.370, respectively), and they represent an average level. However, if to consider weight categories, mean value of correlations between somatic characteristics and the sports level is the

Table 1

Correlations of somatic characteristics with the training experience (TE) and the sports level (SL) among taekwon-do athletes, different weight categories

Somatic characteristics	Weight categories							
	<63 kg, n=5		<71 kg, n=6		<80 kg, n=6		>80 kg, n=4	
	TE	SL	TE	SL	TE	SL	TE	SL
body mass	0.137	-0.635	-0.357	0.131	-0.305	-0.217	0.771	-0.636
body height	-0.560	0.354	-0.307	-0.138	0.256	-0.375	0.607	-0.735
sitting body height	0.100	0.694	-0.322	-0.174	-0.352	-0.131	0.608	-0.513
length of upper extremity	-0.424	-0.150	-0.281	-0.390	-0.220	-0.221	-0.097	-0.689
length of lower extremity	-0.730	0.131	-0.715	-0.561	0.721	-0.627	-0.332	0.148
pelvic width	0.415	0.920	-0.236	0.298	0.298	0.202	0.875	-0.322
shoulders width	-0.607	-0.009	-0.493	-0.058	-0.388	0.255	0.759	0.053
elbow width	-0.161	0.446	-0.173	0.325	-0.100	0.217	-0.143	0.775
knee width	0.741	0.394	0.440	0.202	-0.077	0.749	0.409	0.408
forearm perimeter	-0.564	-0.433	0.474	-0.217	0.731	-0.727	0.466	-0.078
shank perimeter	0.381	0.683	-0.333	-0.652	0.420	-0.802	0.199	0.366
body density	-0.217	0.488	0.377	-0.060	0.770	-0.216	-0.664	0.610
fat %	0.217	-0.489	-0.374	0.063	-0.770	0.215	0.665	-0.610
active tissue %	-0.217	0.489	0.374	-0.063	0.770	-0.215	-0.665	0.610
body surface	-0.588	0.310	-0.313	-0.134	0.210	-0.374	0.835	-0.727
slenderness index	-0.551	0.366	-0.304	-0.139	0.272	-0.375	-0.433	0.243
Rohrer's index	0.531	-0.376	0.283	0.147	-0.268	0.382	0.411	-0.233
BMI index	0.531	-0.379	0.286	0.146	-0.277	0.380	0.545	-0.375
Manouvrier's index	-0.685	-0.430	0.294	0.199	0.624	-0.213	-,318	-0.293
Shoulder-pelvis index	0.732	0.630	0.707	0.553	0.640	-0.034	0.318	-0.812

greatest in the hyper-weight category ($r=0.462$) and the light-weight one ($r=0.440$), and the weakest one in the middle-weight category ($r=0.232$). Level of correlations with the training experience is slightly higher. In hyper-weight category it amounts to 0.506, in light-weight one 0.506, and it is the lowest in the middle-weight category ($r=0.372$).

High level of correlations between somatic characteristics with the sports level in the light-weight category was recorded with reference to the pelvis width

($r=0.92$). In middle-weight category no correlations at high level were noted. In heavy-weight category high correlations of the sports level became apparent with the shank perimeter ($r= -0.80$), knee width ($r=0.75$), and forearm perimeter ($r= -0.73$). In hyper-weight category 4 correlations were revealed at a high level: with the shoulder-pelvis index ($r = -0.81$), elbow width ($r=0.78$), body height ($r= -0.74$) and body surface ($r= -0.74$). The structure of correlations between somatic characteristics and sports level is varied depending on the weight category (Figure 1).

The high level of correlations between somatic characteristics and the training experience in the light-weight category was revealed in relation to the knee width ($r=0.74$) and the length of the lower extremity and the shoulder-pelvis index ($r=0.73$). In the middle-weight category, high correlations were reported with reference to the length of the lower extremity ($r= -0.72$) and the shoulder-pelvis index ($r=0.71$). In the heavyweight category 5 correlations were revealed at a high level: with the body density, and the directly related fat content and

the active body weight (0.77 ; and 0.77 , respectively), with the forearm perimeter (0.73) and the length of the lower extremity (0.72). In hyper-weight category 4 correlations were recorded at a high level: with the pelvic width index ($r=0.88$), the body surface ($r=0.84$), the body mass ($r=0.77$) and the shoulders width ($r=0.76$).

The structure of correlations between somatic characteristics and the training experience is again varied, depending on weight categories (Figure 2).

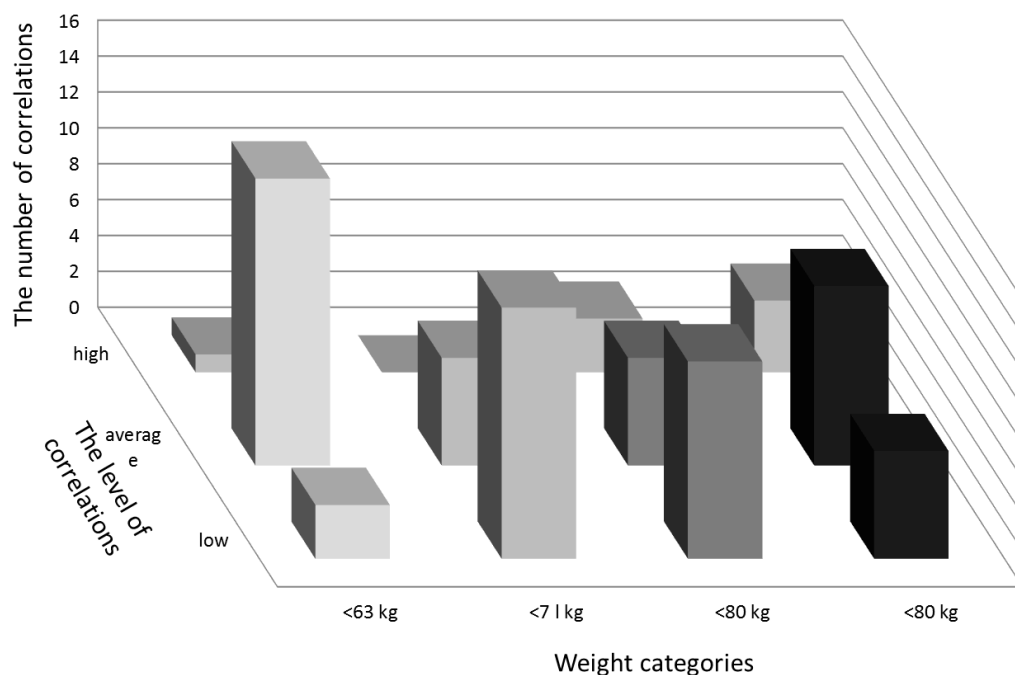


Fig. 2. The structure of correlations between somatic characteristics and the training experience among highly qualified taekwon-do ITF athletes.

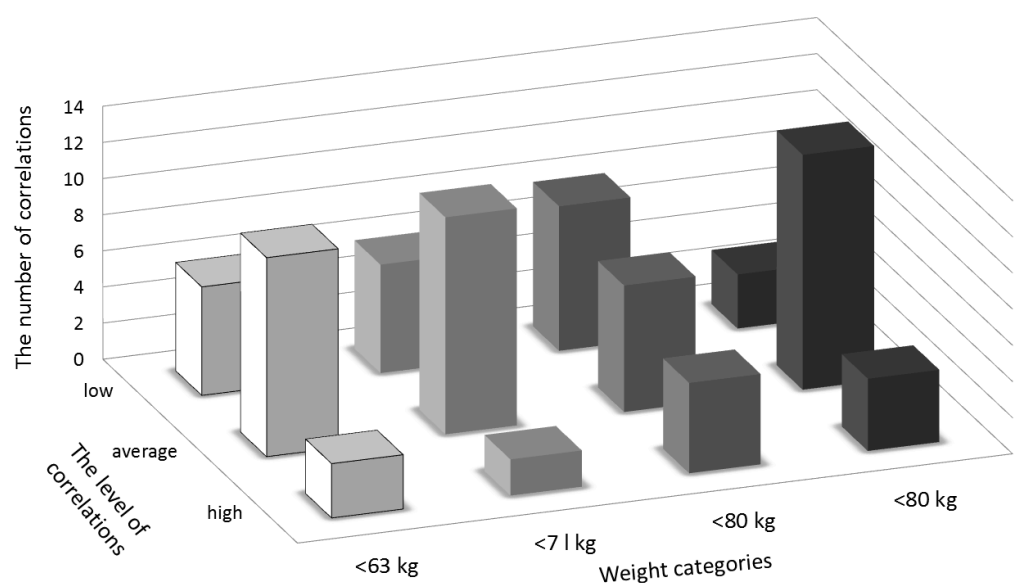


Fig. 2. The structure of correlations between somatic characteristics and the training experience among highly qualified taekwon-do ITF athletes.

Discussion

The study results clearly indicate that the problem of constitutional aspects of taekwon-do ITF athletes' sports championship is a complex scientific issue. In research on Polish male and female representatives in wrestling [12, 13], the authors state that with an increase in body mass also the number and the level of correlations between somatic characteristics and the sports level and training experience increases. Just as in this study, a slightly higher level of correlations is observed with training experience than with the sports level.

A study of Polish representatives in modern pentathlon [9] showed that among women anthropometric indices correlate with the training experience to a greater extent than with sports level. On the other hand, males' sports level is more closely associated with their somatic composition.

An interesting study was conducted with a group of women practicing fencing [5]. A high correlation between body composition and the sports experience was reported only in relation to one somatic index –Manouvrier's index. As to sports level, correlations at high level were revealed with three somatic characteristics: body weight, forearm perimeter and upper extremity length.

The study, which was conducted at the European Championships in tennis [14] revealed an important trend. Along with increase in tennis players' sports level, a reduction in the athletes' body massiveness indices was reported. Hence, the authors conclude that tennis players' slim body build can predispose them to achieving better sports results. Also study of Polish tennis representatives [6] showed that somatic indices have larger impact on men's sports level than on women's. A correlation between tennis players' body composition and their training experience is high with reference to two indices: elbow width and forearm perimeter. Only knee width highly correlates with their sports level. Among men only pelvis width correlates with training experience at high level. In turn, as many as six indices correlate with sports level: body height, upper extremity length, forearm and shank perimeter, body weight and its surface. The authors conclude that the structure of the correlations between somatic indices and sports level and training experience in tennis has a dimorphic character.

Taking into account overall index of correlation of somatic characteristics among Polish representatives in taekwon-do ITF with their training experience and sport level, as in most of analysed researches, a higher correlation was noted with the training experience than with sports level. In all analysed weight categories, mean value of correlations of somatic characteristics with sports level was lower than in relation to training experience.

Shank perimeter highly correlates with sports level in all weight categories (apart from the hyper-weight one) –mean value of correlation index for all categories amounts to 0.63, just as shoulder-pelvis index (apart from the heavyweight category) – 0.51.

High correlation with training experience was reported for lower extremity length (apart from the hyper-weight category) – the mean value of the correlation index was 0.62, for the shoulder-pelvis index (apart from the hyper-weight category) – the mean value of the correlation index was 0.60; for the shoulder width (apart from the heavyweight category) and for the forearm perimeter – the mean value of the correlation index was 0.56.

The results of the conducted studies and literature analysis give grounds to believe that the problem of somatic aspects of sports championship is a very complex and ambiguous issue. A sport discipline (the nature of effort) and the weight categories, in which a bout takes place has an impact on the structure and level of correlations.

Conclusions

1. Correlations of somatic indices with sports level and training experience among Polish representatives in taekwon-do are heterogeneous and largely dependent on weight category.

2. Shank perimeter (apart from the hyper-weight category) and shoulder-pelvic index (apart from the heavy weight category) highly correlate with sports level in all weight categories.

3. Lower extremity length (apart from hyper-weight category), shoulder-pelvis index (apart from hyper-weight category), shoulder width (apart from heavy weight category) and forearm perimeter highly correlate with training experience.

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Информация об авторах:

Ягелло Владислав; д.н. ФВиС, проф.; <http://orcid.org/0000-0001-7417-4749>; wjagiello1@wp.pl; Университет физического воспитания и спорта им. Анджея Снядецкого; Ул. Веска 1, 80-336, Гданьск, Польша.

Козина Жаннета Леонидовна; д.н. ФВиС, проф.; <http://orcid.org/0000-0001-5588-4825>; Zhanneta.kozina@gmail.com; Харьковский национальный педагогический университет имени Г.С. Сковороды; ул. Артема, 29, г. Харьков, 61002, Украина.

Ягелло Марина; <http://orcid.org/0000-0001-5591-4537>; wjagiello1@wp.pl; Университет физического воспитания и спорта им. Анджея Снядецкого; Ул. Веска 1, 80-336, Гданьск, Польша.

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Information about the authors:

Jagiello Wladyslaw; <http://orcid.org/0000-0001-7417-4749>; wjagiello1@wp.pl; Gdansk University of Physical Education and Sport; ul. Wiejska 1, 80-336 Gdansk, Poland.

Kozina Zh.L.; <http://orcid.org/0000-0001-5588-4825>; Zhanneta.kozina@gmail.com; Kharkov National Pedagogical University; Artema str. 29, Kharkov, 61002, Ukraine.

Jagiello Marina; <http://orcid.org/0000-0001-5591-4537>; wjagiello1@wp.pl; Gdansk University of Physical Education and Sport; ul. Wiejska 1, 80-336 Gdansk, Poland.

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