Session 5

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Psychophysiological diagnostics of functional states of judo athletes

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Background and study aim
The methods of psychological diagnostics are ignored the integral criteria of functional states which are used for athletes. That is why the elaboration of psychophysiological diagnostics criteria for higher qualification athletes was study.

The diagnostics of psychophysiological functions gets to information for individual and typological characteristics of higher neural system, peculiarities of forming and improvement of special experience and indicators of fatigue and hypertension of athletes.

The aim of the study was elaboration of psychophysiological diagnostics criteria of the functional states for higher qualification athletes.

Material and methods
The 26 higher qualification athletes (men), members of National team (Judo) were examined. The psychophysiological and neurodynamic functions: functional mobility of nervous processes, strength of nervous processes, time perception, attention volume, operational thinking coefficient and short-term memory volume were registered by a computer system. The differential scale of functional states of psychophysiological functions in athletes was elaborated.

Results
The results of the investigation showed that 10 subjects had high parameters of functional states of psychophysiological functions and 14 have the intermediate level. The functional states of psychophysiological functions in higher qualification athletes characterized functional system which responsible for results of sporting activity. The optimization of the perception and information processing with the use of short-term memory reflects the psychophysiological compensatory mechanisms of decline of visual perception and information processing capability in athletes.

Conclusions
The psychophysiological states in higher qualification athletes are characterized by functional system which is responsible for the result of sporting activity.
The elaboration method of psychophysiological diagnostics gives possibilities to control for functional states of higher qualification athletes with individual-typological peculiarities.
The psychophysiological states in higher qualification athletes are characterized by functional system which is responsible for the result of sporting activity.
The optimization of the perception and information processing by short-term memory reflects the psychophysiological compensatory mechanisms of decline of visual perception and information processing capability in athletes.

References
Age- and gender-specific physiological characteristics of judo athletes

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Few studies have examined judokas’ physiological profiles. The aim of this study was to describe gender, age and rank dependent maximum arm and leg performance of judokas, derived from laboratory tests, which are similar in duration to a judo competition. The test group consisted in 4 female and 14 male (8 adolescents, 6 adults) judokas of different rank. Power and respiratory parameters were assessed during a continuous incremental test with an arm crank ergometer and during a continuous 5 min maximum test on the cycle ergometer.

Table 1  Judokas’ physical characteristics and physiological measurements. Values are mean ± SD. Significant differences at the t-test: *  p<0.05    **  p<0.01    ***  p<0.001. A=adults; a=adolescents. 1=adult men; 2=adolescent men; 3=adolescent and adult women. # These parameters were measured during the 4th minute of the tests.

<table>
<thead>
<tr>
<th></th>
<th>Tot. (n=18)</th>
<th>1-Men A (n=6)</th>
<th>2-Men a (n=8)</th>
<th>3-Women a/A (n=4)</th>
<th>1-2</th>
<th>1-3</th>
<th>2-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>19.1 ± 5.4</td>
<td>25.2 ± 4.9</td>
<td>15.3 ± 0.9</td>
<td>17.8 ± 3.0</td>
<td>***</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>173.1 ± 6.7</td>
<td>176.5 ± 6.5</td>
<td>174.4 ± 5.1</td>
<td>165.5 ± 4.4</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>66.1 ± 11</td>
<td>77.5 ± 11.2</td>
<td>62.8 ± 4.4</td>
<td>55.5 ± 2.3</td>
<td>**</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.6 ± 2.8</td>
<td>24.8 ± 2.7</td>
<td>20.4 ± 0.4</td>
<td>19.4 ± 1.6</td>
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</tr>
<tr>
<td>Body fat (%)</td>
<td>13.2 ± 5.2</td>
<td>12.9 ± 5.8</td>
<td>10.3 ± 2.9</td>
<td>19.5 ± 1.8</td>
<td></td>
<td></td>
<td>***</td>
</tr>
</tbody>
</table>

UPPER BODY

Pm max (W/kg)  | 2.57 ± 0.3  | 2.75 ± 0.33  | 2.57 ± 0.2   | 2.28 ± 0.19       | *   | *  |     |
Time (s)      | 273.1 ± 41  | 308.1 ± 44.2 | 267.5 ± 23   | 232.0 ± 13.9      | *   | *  |     |
VE (l/min)#   | 81.8 ± 17   | 82.2 ± 13.9  | 89.0 ± 18    | 67.0 ± 9.2        |     | *  |     |
VO₂ (ml/min/kg)#| 32.34 ± 4.4 | 30.02 ± 3.5  | 35.49 ± 4.3  | 29.54 ± 0.95      |     | *  |     |
HR (beats/min)#| 164.1 ± 15  | 152.5 ± 7.6  | 172.9 ± 11   | 163.8 ± 19.7      |     |     | *** |

LOWER BODY

Pmean (W/kg) | 3.62 ± 0.4  | 3.95 ± 0.46  | 3.62 ± 0.2   | 3.10 ± 0.14       | **  | *  | **  |
VE (l/min)# | 139.5 ± 35  | 175.5 ± 25.4 | 131.3 ± 20   | 102.0 ± 15.8      | **  | ***| *   |
VO₂ (ml/min/kg)#| 48.49 ± 6.4 | 50.22 ± 6.4  | 49.39 ± 5.7  | 44.09 ± 7.20      |     | ***| *   |
HR (beats/min)#| 183.2 ± 10  | 175.7 ± 4.6  | 188.6 ± 9.2  | 183.8 ± 13.2      |     |     | *** |

Concerning relative parameters of the total group, arm Pmax correlated positively with legs’ Pmean and VO₂peak, whereas arm VO₂peak correlated positively only with legs’ VO₂peak. Rank correlated positively only with arm Pmax among adult men. From these data we can assume that: gender is more important than age in influencing relative upper and lower body power; young athletes’ aerobic capacity with the arms is more important than for the older ones, who are more anaerobically dominant; the percentage of the different energy systems involved during cycling is similar for judokas of different age and gender; judo requires a good state of training of the whole body; upper body’s Pmax is important among adult judokas.
References
Characteristics of the psychophysical structure of top judo players

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²University of Volos, Greece

Abstract

According to the concept of the integrated development by Ismail, Kirkendale, Momirović et al., there are strong connections between intellectual and motorical abilities, and important and complex connections between motorical abilities and personality characteristics. This paper attempts to verify the level of the connection between cognitive abilities, personality characteristics and some motorical abilities, such as speed and coordination. The sample consists of 52 top judo players, including ten representatives of Serbia and Montenegro, males between 19 and 24 years of age. For estimating intellectual abilities, the battery of tests KOG – 3 has been used, for estimating personality characteristics, the battery of tests KON-6 has been used, and for measuring motorical abilities, three tests of speed and three tests of coordination have been used.

The results of the research show that there is a connection between certain personality characteristics, cognitive and motorical abilities, which is in accordance with the theory of the integrated development.
Diagnostics of anthropological status of Croatian judokas

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Faculty of Kinesiology University of Zagreb, Croatia

Introduction
The issue of this paper is to diagnose the status of those basic motor abilities which have been denoted as important in the hierarchical structure of performance in judo. The goal is to analyse motor status of Croatian judokas. The obtained results may be used as a basis for more quality planning of sport training and strategic development of judo in Croatia.

Sample of Variables
First source of data is collected by the Sports Diagnostic Centre at the Faculty of Kinesiology. The following 16 tests are compounds of the comprehensive test battery that assess anthropometric characteristics and motor and functional abilities - functional abilities: RELPO2 - relative oxygen uptake; motor abilities: PT60 – sit-ups in 60 seconds SEL – back extension hold, CUC – squats in 60 seconds, BP70/50 – bench press with 70% and 50% of body weight for male and female judokas, B13Y - 300 yards running, KUS – side steps, B20M - 20 metre sprinting, MESSJ – squat jump, MESMAX -maximal countermovement jump, BML – medicine ball throwing from a lying positin, TAR – hand tapping, CAT-cutting, SAR – sit-and-reach, FLIP – shoulder circumduction with a bar; anthropometric characteristics: PMT – precentage of body fat.

The second comprehensive source of data on physical condition and sport preparedness of judokas in Croatia are the results obtained within the scientific research project "Follow-up of the changes in anthropological status of children aged 11-14 years in wrestling sports". The following tests assessed anthropometric status: ATV – body height, ATT – body weight, AOP – forearm circumference, ANN – upper arm skinfold. Motor and functional abilities were assessed by the following tests: MPN - obstacle course backwards, MPR – straddle sit-and-reach, MTR – hand tapping, MSD - standing broad jump, MPT60 sit-ups in 60 seconds, MIV – pull-up hang, F6 – 6 minutes running, agility on the floor (ONT), side steps (KUS), push-ups in 60 seconds (SKL60), squats in 60 seconds (CUC60), as many series of various throws + two push-ups in 90 seconds (BAC2SKL90).
Results and discussion

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Mean M</th>
<th>Std. Dev. M</th>
<th>Mean F</th>
<th>Std. Dev. F</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
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<td>3.83359</td>
</tr>
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<td>1.22923</td>
<td>16.6000</td>
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<td>RELPO2</td>
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<td>2.55238</td>
<td>47.6625</td>
<td>5.33558</td>
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<td>54.5000</td>
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<td>BP70</td>
<td>26.66667</td>
<td>5.46504</td>
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<tr>
<td>H3Y</td>
<td>59.42500</td>
<td>2.44118</td>
<td>68.9575</td>
<td>4.73979</td>
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<tr>
<td>KUS</td>
<td>7.82778</td>
<td>0.39103</td>
<td>9.3537</td>
<td>0.94431</td>
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<tr>
<td>B20M</td>
<td>3.48222</td>
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<td>MESSJ</td>
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<td>SKL60</td>
<td>16.941</td>
<td>10.9114</td>
<td>32.353</td>
<td>14.9078</td>
</tr>
<tr>
<td>CUC60</td>
<td>42.529</td>
<td>7.0721</td>
<td>52.294</td>
<td>5.1692</td>
</tr>
</tbody>
</table>

Valid N - number of subjects, Mean M - arithmetic mean of male judokas, Std.Dev. M - standard deviation of male judokas,
Mean F - arithmetic mean of female judokas, Std.Dev. F - standard deviation of female judokas.

Table 2. Descriptive indicators of anthropological status of 11 and 14-year male judokas

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Valid N</th>
<th>Mean 11</th>
<th>Std.Dev. 11</th>
<th>Mean 14</th>
<th>Std.Dev. 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV</td>
<td>17</td>
<td>155.471</td>
<td>5.8610</td>
<td>171.329</td>
<td>6.4381</td>
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<tr>
<td>ATT</td>
<td>17</td>
<td>48.453</td>
<td>10.3726</td>
<td>61.982</td>
<td>12.1151</td>
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<td>AOP</td>
<td>17</td>
<td>22.159</td>
<td>2.5899</td>
<td>25.129</td>
<td>2.7633</td>
</tr>
<tr>
<td>ANN</td>
<td>17</td>
<td>12.824</td>
<td>4.9904</td>
<td>10.412</td>
<td>4.2288</td>
</tr>
<tr>
<td>MPN</td>
<td>17</td>
<td>15.564</td>
<td>3.3465</td>
<td>11.783</td>
<td>3.2180</td>
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<td>MPR</td>
<td>17</td>
<td>55.941</td>
<td>7.8060</td>
<td>63.722</td>
<td>4.9073</td>
</tr>
<tr>
<td>MSD</td>
<td>17</td>
<td>167.118</td>
<td>16.9296</td>
<td>196.706</td>
<td>27.3767</td>
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<tr>
<td>MTR</td>
<td>17</td>
<td>26.941</td>
<td>2.8607</td>
<td>30.294</td>
<td>3.2305</td>
</tr>
<tr>
<td>MIV</td>
<td>17</td>
<td>20.831</td>
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<td>18.9643</td>
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<td>MPT60</td>
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<td>37.882</td>
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<td>ONF</td>
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<td>22.618</td>
<td>3.7497</td>
<td>17.871</td>
<td>5.3527</td>
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<tr>
<td>KUS</td>
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<td>11.101</td>
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</tr>
<tr>
<td>BAC90</td>
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<td>12.000</td>
<td>2.1213</td>
<td>14.059</td>
<td>2.8825</td>
</tr>
<tr>
<td>SKL60</td>
<td>17</td>
<td>16.941</td>
<td>10.9114</td>
<td>32.353</td>
<td>14.9078</td>
</tr>
<tr>
<td>CUC60</td>
<td>17</td>
<td>42.529</td>
<td>7.0721</td>
<td>52.294</td>
<td>5.1692</td>
</tr>
<tr>
<td>F6</td>
<td>17</td>
<td>1072.353</td>
<td>126.5049</td>
<td>1328.529</td>
<td>133.7615</td>
</tr>
</tbody>
</table>

Valid N – the number of subjects, Mean 11 – arithmetic mean of 11 years old judokas, Std.Dev. 11 - standard deviation of 11 years old judokas, Mean 14 – arithmetic mean of 14 years old judokas, Std.Dev. 14 - standard deviation of 14 years old judokas.

Closing remarks

The national diagnostic data basis should facilitate the future guiding of judo sport development and sport preparation programming for judokas of various ages and quality levels. Such an approach should improve Croatian judo results thus making the gap between the Croatian and world judo achievements less pronounced.
Properties of motor development in young judokas

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College of Physical Culture and Tourism in Pruszków, Poland
3. Faculty of Physical Education, University of Rzeszów, Poland

Introduction
There are no data concerning properties of motor development in children practicing a given sport discipline in modern literature. Such information is of utmost importance particularly in relation to sportsmen, as in the physical development of young athletes we are faced with two processes, which are opposing from the point of view of energy use. On the one hand, energy is used for plastic processes related to growth, differentiation and maturity of the organism, and on the other hand training loads also lead to significant demand for energy. A training which is incorrectly executed, with excessive loads, may cause some violation of biological regularities in the development of athletes [Wolański 1976; Jaskólski, Wołkow, Jagiello 2005]. Consequently the objective of undertaken studies was to determine properties of motor development of judokas aged 11 to 17.

Material and method
The tests comprised 224 judokas aged 11-17. The basic criterion for selection of athletes to the experimental group was the conformity of their calendar and biological ages. Measurements of motor abilities were executed based on the International Physical Fitness Test. A control group was provided by results of tests of ca. 200,000 boys who were not practicing sport in a regular way [Pilicz et al. 1993].

Results
Through such directed tests it was possible to define the chronology in the motor development rate of judokas aged 11 to 17 (table 1). Such an analysis had to take into consideration three basic elements: absolute values of testing results, significance of their differences and the rate of annual accruals.

Table 1. Chronology in the motor development rate of young judokas

<table>
<thead>
<tr>
<th>Age groups</th>
<th>Speed</th>
<th>Speed and strength abilities</th>
<th>Hand strength</th>
<th>Strength of abdomen muscles</th>
<th>Strength endurance</th>
<th>Aerobic endurance</th>
<th>Agility</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 m run</td>
<td>Long standing jump</td>
<td>Hand strength</td>
<td>Sit-ups from prone position</td>
<td>Chains up</td>
<td>1000 m run</td>
<td>4x10 m run</td>
<td>Bend of the trunk forward</td>
</tr>
<tr>
<td>11-12</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>12-13</td>
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<td>14-15</td>
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<td>15-16</td>
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<tr>
<td>16-17</td>
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</tbody>
</table>

Clarifications: - high level of activity, - medium level of activity, - low level of activity.
Conclusions
Systematic training of young judokas does not violate biological regularities in the motor development characteristic for children which do not practice sport.
Development changes of the studied traits (expressed by absolute testing indices and rate of their increase) confirm the heterochronic character and the sensitivity of motor development in young judokas.
Training leads to changes in the rate of development of motor abilities in young judokas. Despite that the general chronology of sensory periods, characteristic for children who do not practice sport is maintained in young judokas. They differ only by the degree of clearness.

References
Characteristics neurodynamic and psychological functions of wrestlers of different sex

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Background and study aim
Modern sport and sports activity — components of culture of any nation. Growth of participation of women in Olympic movement causes high interest of world community to development of female sports, achievement of leading positions of women in sports at national and world levels [Platonov 1997; Ilyin 2001]. But it is necessary to consider at planning sports preparation of females physiological features which structures of a body, specificities of separate organs and systems, physiological process which occur in connection with activity sexual and others ferrics internal secretions [Shahlina, Futorniy 2003].

The aim of this study was to analyze the results of psychophysiological testing of neurodynamic functions, sensomotor reactions and the psychological functions: perception & memory at male and female athletes.

Material and methods
The participants were 55 athletes of wrestlers (28 males, 27 females) who ranged from 17 to 32 years of age. They were examined: the psychophysiological functions – functional mobility of nervous processes, strength of nervous processes and neurodynamic functions were registered by the computer system «Diagnost – 1» [Korobeynikov, Bitko, Sakal, Kulinich 2003]. The memory function was determined by using a method for measuring short-term memory volume, which consists in estimating the correctly memorised digits among twelve two-digit figures presented for a subject on a display within 30 s [Korobeynikov 2002].

Statistics work was done with the help of the «Statistica 6.0» programer («Stat Soft», USA). The definition of certain differences of the indices was worked out with the usage of Kolmogorov- Smirnov λ- criterium.

Results
Results of the basic parameters neurodynamic functions of brain, of male athletes and female athletes are shown on the Table 1.

Table 1. Psychophysiological parameters in different sex groups of wrestlers

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Males, n=28</th>
<th>Females, n=27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latent period simple of sensormotor reaction, (ms)</td>
<td>234.85</td>
<td>251.51</td>
</tr>
<tr>
<td>Latent period of the complex sensormotor reaction, (ms)</td>
<td>411.58</td>
<td>443.15</td>
</tr>
<tr>
<td>Functional mobility of the nervous processes, (%)</td>
<td>89.29</td>
<td>87.78</td>
</tr>
<tr>
<td>Functional strength of the nervous processes, (%)</td>
<td>4.77</td>
<td>9.52</td>
</tr>
<tr>
<td>Time perception error, (c)</td>
<td>4.89</td>
<td>6.44</td>
</tr>
<tr>
<td>Short-term memory volume, (%)</td>
<td>54.46</td>
<td>53.66</td>
</tr>
</tbody>
</table>

Legend: M-mean value; SD- dstandard deviation; * – p<0.05; ** – p<0.01.

Measurement of the latent period simple sensormotor reactions is widely applied in researches of typological features and a functional condition of the person. Females (\(M = 251.51\),
reported significantly higher latent period simple of sensormotor reaction then males \((M=234.85, SD=21.57)\), \(p < 0.01\). Between values of latent periods complex sensormotor reaction also was the established statistics difference of male athletes \((M=411.58, SD=44.64)\) and female athletes \((M=443.15, SD=56.55)\), \(p < 0.05\). Kolmogorov – Smirnov’s test for the difference in functional strength of the nervous processes showed that males \((M=4.77, SD=1.79)\) were significantly great \((p < 0.01)\) when they in the groupe females \((M=9.52, SD=4.19)\). There were no significant differences \((p > 0.05)\) between results of males and females in the functional mobility of the nervous processes, time perception error & short – term memory volume.

Conclusions

The male athletes have significant differences in the nervous system’ characteristic, and in some displays neurodynamic and psychological functions than the female athletes. At planning training loadings are necessary, on the one hand, realization of an individual approach to training process females, with another – new methods which allow to improve a functional condition of an organism of female athletes and promote increase of sports results.

References

The motor, functional and psychological status of selected judoists

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Success in judo represents the result of the functioning of various components which are intertwined into a single activity, that is, a sum of anthropometric, motoric, functional, cognitive, connative and other factors. The determination of the motor, functional and cognitive dimensions is an important factor in the sport selection process and the creation of a model on the basis of which the training process of judoists is programmed.

A high level of basic motor, cognitive and functional abilities is considered to be the basic requirement for the effective learning of motor structures, their improvement and successful application. Within the training process, the dominant aim has to do with the transformations of basic motor abilities and certain morphological characteristics. Yet, considering the fact that all basic motor abilities cannot be altered to the same extent, and besides that, are deeply rooted in the organized system of other anthropological dimensions, it is very difficult to alter them independently and individually in the desired direction. Due to that, there is no universal system of exercise by means of which it is possible to ensure such a level of basic motor abilities which would suit all the possible forms of movement.

The purpose of this research is to determine the motor, functional and psychological status of selected judoists. The sample of subjects encompassed 40 selected judoists, aged 15 – 17. All the subjects had their names on the long list for the national team on the basis of their standing in the State Finals. For the purpose of evaluating motor abilities, 12 motor tests were used. To describe the structure of the judoists’ personalities, the HSPQ personality test was used, and to evaluate competitive anxiety, the Martens questionnaire, SCAT (Sports Competition Anxiety Test).

The results of the research have indicated that the measured motor abilities of the selected judoists are of a significantly higher value than those found among members of the general public of the same age. The results have also shown that the shortlisted selected judoists scored higher values in relation to the judoists on the long list. Due to continuous strain, where an alteration between the aerobic and anaerobic mechanisms of judoists occurs, functional abilities are also significantly higher in the case of selected judoists.

An analysis of the results for the psychological status indicates that the majority of judoists have a balanced personality profile with a normally developed personal disposition. Most of the judoists are at the optimum level of sport-competitive anxiety, while a smaller number of them are characterized by an increased level of pre-competitive tension in the form of somatic and cognitive anxiety.
Introduction
Improving the level of physical abilities is one of the most important compounds of a training programme and a precondition for achieving the desirable general training status and athletic fitness of wrestlers, appropriate for high-level performance and sporting accomplishments. Inappropriate "foundations" of physical abilities at the lower stages of sport preparation may cause performance limitations at the higher stages of a sport career [Starosta, Tracewski 1998; Baić 2006]. These facts have been known for many years now, and the diagnostics of physical abilities level is an indispensable part of any serious work at any stage of athletes' sport development.

The most quality solutions come from the most developed countries which have a large and quality enough population of top-level wrestlers, and working conditions favourable for conducting investigations of this type. In this area the most distinguished works (about test batteries) are those of Polish authors Starosta and Tracewski [1981] and a Bulgarian author Petrov [1997].

Diagnostics of physical abilities level of wrestlers in Croatia
Diagnostics and analysis of physical abilities level of the Croatian wrestlers is performed by means of a few test batteries, which obstructs the comparison of test results across age periods and the follow-up of physical abilities development of the advanced Croatian wrestlers. The issue is even bigger because no model values have been established yet for the cadet, junior and senior wrestlers according to which their achievements should be compared. The problem is particularly pronounced in the group of junior and senior wrestlers. The reason for that can be attributed to a small number of quality wrestlers in Croatia who can be treated as models. The same problem can be found in many other countries.

Table 2. Descriptive statistic parameters of a part of the tests aimed at assessing selected anthropological attributes of the Polish and Croatian cadet wrestlers of the Greco-Roman style [Baić, Starosta, Marić 2003]
Legend: Group (P) – top–level wrestlers of the Polish national team; Group (H1) – champions of the Croatian National Championships; Group (H2) – second–placed wrestlers at the Croatian National Championships; Group (H1) – third–placed wrestlers at the Croatian National Championships; A.M. – arithmetic mean; S.D. – standard deviation

Recommendations

Therefore, the authors recommend scientifically and practically verified test batteries [Starosta, Tracewski 1981] to be applied to the advanced Croatian junior and senior wrestlers. Such an approach to follow up will not only facilitate wrestling training effects monitoring, but it would also be helpful in international comparison of scientific findings.

References

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The correlation between sports level and selected personality types of persons practising wrestling

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Background and study aim

Present psychology of sport focuses on numerous questions related to different personality traits of athletes, and namely which features are characteristic for persons practising sport for record seeking achievements and to what extent the level of intensification of these features of personality depends on a discipline of sport [Rychta 1998; Perwin 2002]. In this field of science there is a tendency to present a full description of personality of athletes, to create a compact whole consisting of many mutually related elements. In other disciplines of sport a lot of psychological investigations are carried out whereas in martial arts there is a shortage of them [Kalina 2000; Litwiniuk, Błach, Cynarski 2005; Litwiniuk, Daniluk, Błach 2005]. The aim of this research was to search for the correlation between selected personality traits and the level of aggression of competitors practising wrestling.

Material and methods

21 competitors practising wrestling in a sports club GRYF in Chełm were a subject of study. Methods applied were the Questionnaire of Personality EPQ-R by Eysenck and Self-evaluation Questionnaire STAXI-2 to measure the level of aggression.

Results and conclusions

The main feature of wrestling competitors is an average and low level of neurotism. This is probably the reason for their resistance, stability and mental balance. Over half of the studied athletes, that is 62,5% belong to the group of extroverts, 25% ambiverts and 12,5% introverts (Fig. 1).

It was also discovered that the competitors practising wrestling possess mostly low and average level of aggression (state, feature as well as expression and control of aggression) and among the studied the predominant type of personality is "B" (56,25%).
References
The influence of practising aikido on scoliosis at children

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Traditionally, in treatment of scoliosis some schematic forms of exercises are applied for correction of spine deformations. Such procedures seem monotonous and by this they are often poorly accepted. Another drawback is the fact that these exercises are considered literally as therapy which evokes at children negative feelings. Aikido exercises may be an attractive alternative for this. They are interesting as art of self-defence, and they can simultaneously fulfil compensating and corrective function in treatment of lateral curvature of the spine. It was confirmed [Mroczkowski 2002], that in group practising this eastern combat art, frequency of occurrence of spinal deformities at boys was essentially lower than the average for population at a given school. It was noticed [Karski 2002], that practicing aikido can prevent scoliosis and cure it. The combat art applied in experiment, apart from its healing nature and thanks to its foundations in budo [Jaskólski 2000], represents pedagogical values teaching young men humility and highly ethical and moral conduct.

Aim of investigations
The aim of the paper was to examine the influence of aikido exercises on the angle of lateral bending of spine in the frontal position in case of scoliosis.

The material and the method of investigations
The subject of investigation were children with the grade I scoliosis according to Gruca. The boys facing the threat of scoliosis due to slanting pelvis in frontal position were also qualified for investigation. Altogether 202 boys in age 7-10 years were subjected to the investigation. There were three investigative groups. The experimental group consisted of 68 children who practised aikido. Two control groups were created. The first one included 59 children. Children from this group did not participate in any forms of correctional gymnastics. The second group included 75 children attending correction gymnastics exercises led in the traditional way. The investigation was conducted by use of Posturometer S [Śliwa 1997] and performed in course of the school year 2002/2003.

Results and conclusions
During investigation, the decrease of the angle of the spine lateral bending was noted in the control group participating in the correction exercises conducted in the traditional way. The same effect was not noted in the control group participating in this type of exercises. In the control group, it was confirmed that practicing aikido caused decrease of the angle of lateral spine bending. The results proved the increase of the angle at subjects with the lateral spine bending at slanting pelvis in the frontal position but lacking such a deformation at the beginning of the experiment. Aikido exercises caused however, that the growth of this angle was indeed smaller in experimental group in comparison to control groups.

References
Injuries in martial arts and combat sports – a comparative study

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The level of sporting mastery in majority of sports requires loads similar to maximum possibilities of a human organism. Doing many sports is unfortunately connected with risks for health. It concerns in particular injuries of movement organs.

At present there are sports with so-called high degree of risk connected with practicing them. This group includes, among others, combat sports. Probably the main argument supporting this approach to them was the essence of rivalry – direct combat of two competing sports persons [Bujak 2003]. Dobrzański states that “Impact of energy from outside causing damage of a living organism is called an injury” [Dobrzański 1984]. Almost all injuries connected with sport are caused by mechanical energy. Damages being a consequence of an impact are called injuries.

“Combat sports are customarily called a group of those sports which essence of competition consists in direct combat of two competing sports persons” [Kalina 2000, p.18]. On the other hand “Martial arts are a historical category of perfect systems of hand-to-hand fight and wielding weapon connected with elements of metaphysics” [Cynarski 2004, p.20]. Cynarski states that fight – on the way of martial arts – is not (in contrast to combat sport) a form of negative cooperation but, paradoxically, a form of positive cooperation.

Aim of study. The main aim of the study was estimating and evaluating the level of injuries in different martial arts and combat sports.

Material and method. The research has been conducted on a target group of 282 practitioners of various martial arts and combat sports. As it happens in the environment of people doing sports, the majority of respondents were males – 257 compared to 25 women. (However, in statements by only two women there is information about injuries.) Those are contestants being at the top in the world, very successful in their sports. Among them there are Olympic, world and European champions. Among the practitioners of far eastern martial arts there are many holders of high and the highest master’s degrees of ‘dan’. The survey has been conducted with contestants at various ages among whom some finished their professional careers. There are also data concerning deceased people which had been collected earlier. The tool used here has been the ‘budō questionnaire’ consisting of five open questions. It is very important to note that some practitioners have done more than one martial art or combat sport.

Results. Research concerning injuries in martial arts and combat sports indicated that in case of majority of practitioners the sporting career has not gone without an injury. Only 6 contestants did not suffer from any injury which is 11.1% of the studied group (questionnaires with incomplete data have been rejected). Respondents skipped information about minor injuries like bruises and abrasions. Particular types of injuries were typical for particular forms of rivalry.
Fig. 1. Percentile of injuries in all martial arts and combat sports
[Source: own research]

The fact that great majority of contestants practicing martial arts and combat sports suffered from at least one injury during their professional career may suggest high level of risk connected with professional practicing these sports. However, it concerns a selected group which does not fulfill the condition of being representative.

References

Reaction time, movement time and EMG signal in combat sport

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Background
From the training process point of view one should take into consideration the meaning of the dominant stimuli which are characteristic to the particular sport discipline or event. The purpose of the present study was to examine RT, MT and EMG signal for tactile, acoustic and visual stimulation in combat sport. In running track & fields events, swimming, skating etc. perception and fast identification of acoustic stimuli play significant role. Combat sports (fencing, taekwondo, karate) are outstanding of wide range of requirements in tactile and visual perception scope.

Material and methods
To the research (N = 33) athletes were chosen (average age 22,3) actively practicing fencing, taekwondo and karate for 8,3 years. They represented advanced stage of training. As a research tool an innovative system of surface electromyography (sEMG) with peripheral equipment which enables reactions to tactile, audio and visual stimulation was applied.

The research position consists of computer with software connected with electromyography which links with two pairs of electrodes and the reference electrode through the binary outlets. The EMG apparatus has the outlet to the testing panel with buttons consisting in this way a complete system of information processes research. Optionally, leg pedals are used in the RT research of lower limbs. In fact that the computer display can emit only visual stimuli a loud speaker was included to the system. Besides electromagnet causing tactile stimuli was applied as well.

Results. The research system registered RT, MT and EMG to tactile stimulus (RTT, MTT, EMGT), acoustic stimulus (RTA, MTA, EMGA) and visual stimulus (RTV, MTV, EMGV).

The test t procedure for dependent variables confirmed significant differences among three indicators of reaction time: RTV vs. RTT (p = 0,001), RTV vs. RTA (p = 0,001) and RTT vs. RTA (p = 0,021). There were no important differences in MT parameters which oscillated between 214 to 221 ms. Statistical significance level for MT of three kinds of stimulation amounted MTV vs. MTT (p = 0,819), MTT vs. MTA (p = 0,698), MTA vs. MTV (p = 0,601). The results were similar because of the fact that the subjects had to cover the same distance (35 mm) using their fingers. The fact of significant time differences within RT among the three trials did not influence on MT fluctuation.

The data suggest significant variability of EMG parameters. The highest values concerned the differences between indicators EMGA vs. EMGV (p = 0,002) and between EMGT vs. EMGV (p = 0,003). As far as differences EMG signal on tactile stimuli and acoustic stimuli are concerned the significance level was p = 0,048. The results showed that the tactile and acoustic stimulation caused lower level of EMG signal. They indicate that participants’ observation of visual signals causes the decrease of muscle tensions without effect of RT reduction.

Conclusions
Results confirmed that the reaction time to exteroceptive stimulation hesitates within 90 ms to 130 ms, to acoustic stimuli is from 20 ms to 50 ms longer and to light signals it shapes on the level from 180 ms to 200 ms. The researchers testing different kinds of reaction. Tyshler, Tyshler [1995] and Czajkowski [2001] came to the same conclusions. They also stated that advanced athletes reduce considerably the time reaction mainly in responses to visual stimuli. The author’s own research [Borysiuk, Zmarzły 2005] concerning physical active students and with the appliance of sEMG system show that RTT (reaction time of tactile stimuli) is about 20 ms shorter than RTA (reaction time of acoustic stimuli) and about 80 ms lower in reaction to visual stimuli (RTV). Understanding of perception and processing information coming from three senses (touch, sound and vision) and their mutual interaction is the basic task of each teacher and coach. Trainers’ practice confirms that the brain automatically integrates information from all the senses and gives priority to the stimuli which are necessary to the competition Knowledge of speed processing of different signals brings feedback to athletes. It teaches concentration and reaction to initial signals and anticipation of opponent’s actions. It allows to recognize significant signals and to ignore misleading information e.g opponents feigning actions, camouflage intentions, feints etc. Coaches participating in the training should take into consideration tactile, acoustic and visual signals as the ones which play the main control role in external feedback mechanism.

References