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**ACTA FACULTATIS EDUCATIONIS PHYSICAE
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LACTATE METABOLISM IN DEPENDENCE ON THE LEVEL OF AEROBIC ABILITIES OF JUDOKAS

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Summary: The aim of our intra-individual research was to prove the relation between the lactate metabolism after anaerobic workload in training of judokas and the level of aerobic endurance expressed by maximal oxygen consumption (VO₂max). With the approval of the coaches, three judokas – men, representatives of Slovakia, average age 17 (±1), average height 170 (± 9.53), weight 66.32 (± 7.78) kg, participated in this study. Selected sample of judokas were willing to undergo the testing, to assess: 1. VO₂max on treadmill, 2. The level of blood lactate after six training sessions in duration of 4 minutes, with 4 minutes rest between the training matches, 3. Decrease of lactate in 5th, 10th and 15th minutes after the end of the last training match. According to some foreign studies, we tried to prove if the higher level of VO₂max means also the faster metabolism of blood lactate under the load with the dominance of anaerobic replenishment of energy. The results have confirmed our hypothesis, but it is necessary to verify our study comprising of other and more exact measurements involving higher number of participants and using statistic methods.

Key words: judo, VO₂ max, blood lactate, metabolism

Introduction

According to the sports performance analysis in different sport branches, it is obvious that the majority of specific physical activities in competitive conditions are based on ability to perform physical task once or repetitively in anaerobic environment.

Anaerobic processes are activated when the intensity of the physical activity exceeds the ability of organism to provide muscles with necessary oxygen. Energy requirements are running in anaerobic conditions. Anaerobic alactate capacity is the ability to perform physical activity of maximal intensity in duration from 20 to 30 seconds, or by higher number of repetitions of alactate performance. The sports performance in judo is considered to be of an intermittent character of workload (Pulkkinen, 2001).

Anaerobic lactate tolerance can be defined as the ability to produce high level of lactate (lactic output) and the ability to tolerate it (lactic capacity). Lactate is a salt of lactic acid. Lactic acid is of sour taste, it is easily soluble, colourless, crystalline acid with this formula: CH₃-CHOH-COOH. Anaerobic alactate training stimuli come out from the realization of physical workload with maximal intensity of short duration (up to 6 – 8 seconds – alactate

output, up to 20 seconds – lactate capacity) and the dominant energy pathway is ATP + CP (Hamar, Lipková, 2001). The anaerobic alactate system is significantly influenced by the volume of fast glycolytic fibers and the level of training ability. After the depletion of phosphate supplies (for the ATP resynthesis), the second system for energy replenishment in anaerobic conditions is activated.

Anaerobic glycolysis provides energy for working muscles of maximal or submaximal intensity for a period ranging from 20 s to 1 minute (anaerobic lactate output) and from 1 to 2 – 3 minutes (anaerobic lactate capacity). Average values of blood lactate in men judo matches is $12.3 (\pm 1.8) \text{ mmol.l}^{-1}$ (Degoute et al., 2003). Blood lactate volume in judo is mostly dependant on contest duration, where the level of blood lactate is increasing with lengthening of match duration (Štefanovský, Janata, 2010). It is also dependant on quality of contestant and fighting strategy (Kampmiller et al., 2008). It takes relatively long time to utilize and remove lactate from blood. Accumulation of lactate leads to high acidosis of organism, which has negative influence on respiratory compensation of acidosis, enzymatic regulation of metabolism in muscle, on movement regulation, on psychic and during replenishment of energy supplies (Virus, Viru, 2001).

The third energy pathway, oxidative system plays the most important role, as the most effective way of replenishment of ATP +CP to normal values during intermittent workload. Recovery of fast glycolytic fiber depends on the ability of organism to activate transmitters, which bind and transport lactate to blood circulation. Transport of lactate from glycolytic fibres increases pH and enables ATP resynthesis from glycogen supplies. Lactate transport is realized by: a) transportation from glycolytic fibres (via transmitters); b) metabolization, which takes place in slow, or fast fibres, or by blood in liver (Cori cycle). Both types of athletes, dynamic and endurance types occur in judo. Endurance judokas with I and II X types of fibres are able to repeat their offensive actions more often but with lower intensity. Judokas with prevailing fast fibres of type II A are able to perform movements with much higher intensity at the same time, the fatigue occurs earlier. From the point of view of training praxis it is necessary to develop both energy systems, oxidative and anaerobic (alactic and lactic). Judoka should be able to train in high intensity and tolerate high level of blood lactate.

Detanico et al. (2012), Wolska (2010, 2009) a Gariod et. al. (1995) proved in their researches that higher level of aerobic abilities led to lower level of lactate accumulation in judo matches. The aim of our study was to verify the relation between VO₂max and metabolism of blood lactate after workout.

Methodology

Three judokas – men, representing Slovakia, average age $17 (\pm 1)$, average height $170 (\pm 9.53)$, weight $66.32 (\pm 7.78) \text{ kg}$, with the approval of the coaches, participated in this study. Participants were required to complete the testing in the following order: 1. VO₂max on treadmill, 2. The level of blood lactate after six training sessions in duration of 4 minutes, with 4 minutes rest between the matches, 3. Decrease of lactate in 5th, 10th and 15th minutes at the end of the last training match.

Spiroergometry on treadmill is a test evaluating functional response of the organism to physical load, measuring in the breath by breath mode. The test is used to determine oxygen consumption and carbon dioxide output. The examination was realized on treadmill HP

Cosmos and for analysing the composition of the respiratory gases spiroergometric unit from Schiller with gas analysis Ganshorn Power Cube was used. Before the start of the test, participants performed a warm-up consisting of light jogging.

Blood lactate taking took place in the international training camp in Bratislava, judokas from several countries participated there (POL, HUN, AZE, CZE, SVK, SLO, UKR). Lactate was taken in the 3rd minute after each match. The match lasted 4 minutes with 4 minutes rest. Participants completed six matches, sparing partners were randomly selected. Gradient of lactate was measured in the 5th, 10th and 15th minute at the end of the last match. After taking all blood samples, which were removed from their own body in terrain, the level of blood lactate was consequently evaluated by BIOSEN C – LINE. Basic descriptive statistics (arithmetic mean, standard deviation, min, max) was used for data processing. Logical methods were used for interpretation of results and compared with the data from international scientific works.

Results and discussion

Average value of lactate during the six training matches for the participant M. M. with the value of VO_{2max} $52.40 \text{ ml.kg}^{-1}.\text{min}^{-1}$ was 4.5 mmol.l^{-1} . Participant M. B. (VO_{2max} $54.20 \text{ ml.kg}^{-1}.\text{min}^{-1}$) achieved 5.36 mmol.l^{-1} and participant M. L. (VO_{2max} $58.50 \text{ ml.kg}^{-1}.\text{min}^{-1}$) achieved 5.54 mmol.l^{-1} . Very similar values of blood lactate were also noticed in the training of judokas in junior category (Péterová et al., 2013). After observing senior American judokas for the period of three months, Callister (1991) had noticed almost two times higher average values of blood lactate (8.4 mmol.l^{-1}). These judokas were practising randori – training matches mostly in the duration of 3 min with 30 s rest and the level of blood lactate was increasing with the increased number of randori bouts. Czechoslovak judokas achieved also higher levels of lactate (from 5.7 to 7.9 mmol.l^{-1}) during the training bouts in duration from 3 to 10 min (Žára, 1989). All the studies mentioned above, including our measurements of the levels of blood lactate during the training bouts of judokas are significantly lower, in comparison with competitive bouts ($12.3 \pm 1.8 \text{ mmol.l}^{-1}$) (Degoute et al., 2003). According to the analysis of available scientific studies, the level of blood lactate of judokas is mostly dependant on the duration of the bout, recovery time, quality of opponents and motivation, proportion of slow and fast fibres and fighting strategy.

After the completion of 6 training bouts (Figure 1), the results showed that the participant with the highest maximal oxygen consumption ($58.5 \text{ ml.kg}^{-1}.\text{min}^{-1}$) had the fastest metabolism of lactate during the three lactate measurements. The lowest reference values of lactate were also noticed during the each measurement ($3.57 - 3.19 - 2.36 \text{ mmol.l}^{-1}$).

On the contrary judokas with the lowest VO_{2max} ($52.40 \text{ ml.kg}^{-1}.\text{min}^{-1}$) had the slowest metabolism of lactate and in the 10th minute was the value still higher than in the 5th minute of lactate taking ($4.08 - 4.5 - 3.08 \text{ mmol.l}^{-1}$).

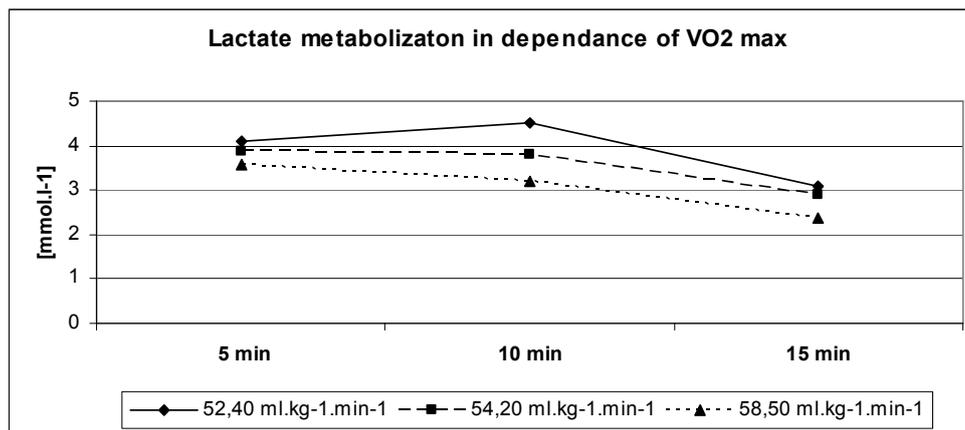


Figure 1

Lactate metabolization of participants with different level of VO2 max.

Detanico (2012) came to the similar conclusions by observing the relation between aerobic and neuromuscular index during specific judo movements. He noticed that the main indicator of aerobic capacity was inversely proportional to the relation of values of blood lactate after the completion of training randori, which indicates, that athletes with the higher level of aerobic capacity performed judo movements with the lower contribution of anaerobic glycolysis.

Gariod et al. (1995) proved that judokas with higher level of VO2 max showed faster creatinphosphate (CP) resynthesis in comparison to judokas with lower level of VO2 max. Judokas with higher VO2 max gained from faster CP resynthesis, faster lactate utilization, return of pH to basic values during the rest. In similar studies of Franchini et al. (1998 a 2003), relation between aerobic capacity and lower lactate concentration after randori was documented. The authors also proved that active recovery meant faster lactate utilization in comparison to passive recovery. Aerobic output is determinative factor for keeping up the intensity, mostly in bouts with maximal duration.

The same intraindividual research, in our conditions, was realized on hockey players by Laco (2011), who observed athletes with different level of VO2 max and the study showed that higher values of VO2 max meant lower values of lactate after each changing on the fly, resp. during the breaks between the periods.

Analysis of our results and the available literature indicates that higher level of VO2 max will be probably advantage rather for endurance types of judokas, mostly in the situations when the bouts are interrupted, in overtime periods, resp. in the breaks between the matches during one competitive day. This can signify faster regeneration of athlete, resp. faster mobilization to the following matches. The values of VO2 max do not have to automatically mean the advantage during the match, because according to the structure of the sports performance in judo, also explosive types of athletes are very successful. Coaches must consider the importance of the development of both energy pathways – oxidative system

and anaerobic system as well and apply them appropriately according to the requirements of the sports periodization in annual plan.

Conclusion

1. Values of the blood lactate during the training bouts reached different levels, which is influenced by the duration of the bout, recovery duration, quality of the contestant, self-motivation during randori, and the proportion of slow and fast fibers. Our values of blood lactate were at the same time lower than those ones measured during the competitive bout. This should be a signal and requirement for coaches to use other additional high-intensity general and also specific exercises before, during and after randori, or simulate training bouts – randori according to competitive conditions, which are often missing in praxis.

2. Rate of the lactate utilization with our three judokas, after the end of training bouts was influenced by the level of VO₂max. This can be seemingly a great advantage, especially during the one competitive day, when the successful athlete has to complete 4 up to 7 matches and the break between them is getting shorter, with the exception of finals.

3. It is necessary that the sports preparation of judokas in accumulative period is also focused on development of aerobic endurance with the usage of more intensive methods, e. g. short distance intermittent method.

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RESUMÉ

METABOLIZÁCIA LAKTÁTU V ZÁVISLOSTI OD ÚROVNE AERÓBNÝCH SCHOPNOSTÍ DŽUDISTOV

M. Štefanovský, E. Laczo, S. Kraček, Ž. Csáderová, P. Lopata, L. Lengvarský

Cieľom nášho intraindividuálneho výskumu bolo overiť vzťah medzi metabolizáciou laktátu po aneróbnom zaťažení v tréningu džudistov a úrovňou aeróbnej vytrvalosti, vyjadrenou maximálnou spotrebou kyslíka (VO₂max). Traja džudisti – muži, reprezentanti SR, priemerný vek 17 (±1) rokov, priemerná telesná výška 170 (±9,53) cm, telesná hmotnosť 66,32 (± 7,78) kg participovali po súhlase svojich trénerov na tejto štúdií. Pre účely tohto výskumu sme vybraných športovcov podrobili testovaniu, pričom sme zisťovali: 1. VO₂max pri behu na bežiacom páse, 2. hladinu krvného laktátu po šiestich tréningových zápasoch s trvaním 4 min., so 4-minútovou prestávkou medzi kolami, 3. laktátový spád v 5., 10. a 15. minúte od skončenia posledného tréningového zápasu. Na základe niektorých poznatkov zahraničných štúdií sme sa pokúsili overiť, či vyššia úroveň VO₂max môže znamenať rýchlejšiu metabolizáciu krvného laktátu pri zaťažení s dominanciou anaeróbnej úhrady energie. Výsledky nášho výskumného sledovania tento predpoklad potvrdzujú, je však potrebné uskutočniť ďalšie exaktné merania s vyšším počtom probandov a s použitím štatistických metód.

THE INFLUENCE OF SPEED STRENGTH ABILITIES ON BASKETBALL SKILLS

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Summary: Frequent changes of direction and speed, acceleration and deceleration, vertical jumps and explosive movements of upper limbs are typical for basketball, therefore there can be said, that speed strength abilities are crucial in basketball performance. The aim of the work was to determine the influence of speed strength abilities on basketball skills. The research was carried out during 8-week period in 15-years-old basketball females. Experimental group (EG) had speed strength training programme.

In the tests of speed strength abilities where was a significant difference between control group (CG) and EG in performance changes at 1% level, EG achieved following increases: in diagnostic series in drop jumps: from 0.2 m: 2.93 ± 3.35 cm, from 0.8 m: 3.82 ± 3.88 cm, bench press, 17.5 kg resistance: 14.34 ± 18.14 W. At 5% level of statistical significance: 10 seconds maximal jumping test (jump height): 1.42 ± 2.21 cm, drop jump from 0.4 m: 2.21 ± 3.8 cm, from 0.6 m: 2.79 ± 2.42 cm, bench press 12.5 kg resistance: 18.84 ± 17.06 W, 15 kg: 12.62 ± 21.55 W, 20 kg: 16.24 ± 18.8 W. At 10% level of statistical significance: 10 seconds maximal jumping test (power output): 0.66 ± 1.96 W.kg⁻¹.

In the tests of basketball skills where was a significant difference between CG and EG in performance changes at 1% level, EG achieved following increases: in dribbling slalom 1.24 ± 1.00 s, rebound test: 9.36 ± 4.03 points, wall pass test: 1.93 ± 1.49 points. At 5 % level of statistical significance – timed lay-up test: 7.62 ± 10.57 s.

Based on the test performance changes there was determined significant correlation between jump height in 10 second jumping test and agility test ($p < 0.01$), bench press with 15 kg resistance and dribbling slalom ($p < 0.05$), power output in barbell squat jump with 22.5 kg resistance and dribbling slalom ($p < 0.05$) and jump height in barbell squat jump with 22.5 kg resistance and timed lay-up test ($p < 0.05$).

Speed strength stimulus caused significant differences in the increases in speed strength abilities and basketball skills in EG. There was confirmed correlation between performance increases in speed strength abilities and basketball skills in four cases.

Key words: basketball, speed-strength abilities, individual skills

Introduction

Based on the definitions of basketball (Mangi, Jokl, Dayton, 1987; Luig, Henke, 2010) we can state that it is characterized by huge dynamics and intense body contact. Changes of direction and speed in a basketball match can be considered as one of the most typical mo-

vements of a player. McInnes et al. (1995) determined that players change direction on average every 2 seconds. Therefore there is a need for frequent acceleration and deceleration during a basketball movement, in other words need to speed up or slow down as quickly as possible at the smallest space as possible. High intensity of the game can also be indicated for example by sudden changes of movement types and speed levels, jumping and sudden stopping and starting which all have a very explosive character. This applies also to upper limb movements such as dribbling, passing or shooting. The execution of those movements depends mainly on power and strength of lower and upper limbs, agility, coordination, and speed of cyclic and acyclic movements of aerobic and anaerobic character (Erčulj, Dežman, Vučković, 2003; Stone, 2007; Zwierko, Lesiakowski, 2007). For players to have an advantage over their opponents, they need to be faster and stronger than their opponents. This requires a sufficient level of player's speed strength abilities.

A number of studies confirm that speed strength training or plyometric training has an enhancing effect on the jumping abilities of basketball players (Brown, Mayhew, Boleach, 1986; Matavulj et al., 2001; Ondruš, 2002; Khlifa et al., 2010; Padych, 2012). Fewer studies deal with the relationship between speed strength abilities and basketball skills. For example Sekulic et al. (2013) confirmed as the most important predictor of agility in women speed strength abilities of lower limbs. Dominic, Talabi (2008) confirmed significant correlation between shooting tests and speed-strength abilities of lower and upper limbs.

Aim

The aim of the work was to determine the influence of speed strength abilities on basketball skills during 8-week period in 15-years-old basketball females in control and experimental groups. Experimental group had speed strength training programme.

Methods

Basic characteristics of the 13 members of control group at the time of pre-tests: mean body height 1.73 ± 0.06 m, mean body weight 64.62 ± 5.70 kg, mean BMI 21.69 ± 1.55 , mean age 15.08 ± 0.47 years and mean sport age was 4.78 ± 2.18 years and at the time of post-tests: mean body height 1.74 ± 0.06 m, mean body weight 65.08 ± 6.38 kg, mean BMI 21.53 ± 1.46 , age and sport age were unchanged. Basic characteristics the 14 members of experimental group at the time of pre-tests: mean body height 1.69 ± 0.04 m, mean body weight 62.79 ± 8.39 kg, mean BMI 21.85 ± 2.43 , mean age 14.93 ± 0.26 years and mean sport age was 4.93 ± 1.62 years and at the time of post-tests: mean body height 1.70 ± 0.04 m, mean body weight 62.93 ± 8.75 kg, mean BMI 21.73 ± 2.46 , age and sport age were unchanged. By means of Mann-Whitney U-test there were determined no significant differences between CG and EG at the time of pre-tests and post-tests.

During the experimental period (8 weeks between pre-testing and post-testing) EG was engaged in special training programme 4 times per week (total time of exercise was 900 minutes). This programme was integrated to basketball training and it was aimed at plyometric exercises, jump rope exercises, acceleration drills and power development in upper limbs. In order to prepare the players for the high demands of the programme, the preparatory period contained general strength exercises. To increase the validity of the experiment basketball parts of training were conducted similarly in both CG and EG, particularly skill exercises.

The devices used in testing speed strength abilities were: Fitro Dyne Premium and Fitro Jumper. Fitro Jumper is a PC based diagnostic system for the assessment of jumping performance. High reliability of Fitro Jumper has been confirmed by Tkáč et al. (1990); Zemková, Hamar (2005). Fitro Dyne Premium is a computer based system for the assessment of strength capabilities and feedback monitoring of strength training. High reliability of Fitro Dyne Premium has been proven by studies of Jennings et al. (2005) and Fry et al. (2006).

For the diagnostics of the level of speed strength abilities there were used following tests:

Bench press: diagnostic series with 10 kg, 12.5 kg, 15 kg, 17.5 kg, 20 kg barbell. Power output was taken into consideration. Devices used: computer, Fitro Dyne Premium, barbell, barbell discs. Test reliability: Jennings et al. (2005).

10 seconds maximal jumping test: 2 attempts, power output in active phase (P) and jump height (h) in 3 best jumps during the better out of two attempts were taken into consideration. Devices used: computer, Fitro Jumper. Test reliability: Tkáč et al. (1990).

Drop jumps from different heights (0.2, 0.4, 0.6, 0.8 m): 2 attempts, jump height in the better attempt is taken into consideration. Devices used: computer, Fitro Jumper, plyometric boxes. Test according to Zemková, Hamar (2004).

Countermovement jump: 2 attempts, jump height in the better attempt is taken into consideration. Devices used: computer, Fitro Jumper.

Seated box jump: 2 attempts, jump height in the better attempt is taken into consideration. Devices used: computer, Fitro Jumper, a box.

Bar/barbell squat jump: diagnostic series with a plastic bar (0 kg resistance) and barbell (10 kg, 12.5 kg, 15 kg, 17.5 kg, 20 kg, 22.5 kg, 25 kg). Power output and jump height were taken into consideration. Devices used: computer, Fitro Dyne Premium, Fitro Jumper, bar, barbell, barbell discs, cloth cube for indicating depth of squat. Test reliability: Jennings et al. (2005).

The device used in testing skills was Fitro Agility Check. It is a PC based diagnostic system for the assessment of agility performance. The system consists of four contact switch mattresses connected by means of an interface to the computer. A special software measures the times subject needs to accomplish foot contact with the mattress corresponding with the position of visual reaction stimulus in one of the four corners of the screen. The reliability of this device was evaluated as sufficient by Zemková, Hamar (1998).

The level of individual basketball skills was evaluated by following tests:

Agility test: modified test by Zemková, Argaj (2007). Two attempts, the mean of the four best reaction times in better attempt is taken into consideration.

Dribbling slalom: test by Bös (1988). Two attempts; time of the completion of the slalom is measured. Better attempt is taken into consideration.

Repeated rebound test: test by Bös (1988). Test lasts 30 seconds, there are 2 attempts. Better attempt is taken into consideration.

Wall pass test: test by Bös (1988). Test lasts 30 seconds, there are 2 attempts. Better attempt is taken into consideration.

Timed layup test: the adjusted form (Tománek, 2006; Pimpa, 1968) of the test by BÖS (1988) is used. There are 2 attempts. Better one is taken into consideration.

Shooting from 4 meters test: test by Bös (1988). Test lasts 1 minute, there are 2 attempts. Better attempt is taken into consideration.

Free throws test: test by Brace (1966).

The obtained data were processed by means of Spearman pair correlation analysis, Mann-Whitney U-test and Wilcoxon T-test. IBM SPSS Statistics programme, v. 20 was used.

Results and Discussion

The performance changes in all the tests were compared in EG and CG.

In bench press diagnostic series with 12.5 kg resistance, CG performance decreased by 1.01 ± 16.62 W and EG performance increased by 18.84 ± 17.06 W ($p < 0.05$). With 15 kg resistance CG performance decreased by 8.0 ± 25.31 W and EG performance increased by 12.62 ± 21.55 W ($p < 0.05$). With 17.5 kg resistance, CG performance decreased by 6.47 ± 19.39 W and EG performance increased by 14.34 ± 18.14 W ($p < 0.01$). With 20 kg resistance CG performance decreased by 0.98 ± 22.65 W and EG performance increased by 16.24 ± 18.8 W ($p < 0.05$). The only case with no significant was with 10 kg resistance. In this case CG performance increased by 3.88 ± 15.61 W and EG performance increased by 13.7 ± 20.16 W.

Two parameters were taken into consideration in 10 seconds maximal jumping test—power output [W/kg] and mean jump height [cm]. Power output in CG decreased by 0.62 ± 2.29 W/kg and in EG it increased by 0.66 ± 1.96 W/kg ($p < 0.010$). Jumping height in CG decreased by 0.66 ± 1.64 cm and in EG it increased by 1.42 ± 2.21 cm ($p < 0.05$).

In 0.2 m drop jump CG performance decreased by 1.78 ± 2.67 cm and EG performance increased by 2.93 ± 3.35 cm ($p < 0.01$). In 0.4 m drop jump CG performance decreased by 0.62 ± 2.15 cm and EG performance increased by 2.21 ± 3.8 cm ($p < 0.05$). In 0.6 m drop jump CG performance increased by 0.26 ± 3.12 cm and EG performance increased by 2.79 ± 2.42 cm ($p < 0.05$). In 0.8 m drop jump CG performance decreased by 0.27 ± 2.28 cm and EG performance increased by 3.82 ± 3.88 cm ($p < 0.01$).

There were no significant differences between CG and EG in countermovement jump and seated jump.

In bar/barbell squat jump there was only one significant difference between CG and EG, specifically in jump height (0 kg resistance). CG performance decreased by 0.78 ± 3.11 cm and EG performance increased by 1.32 ± 2.58 cm ($p < 0.10$).

EG performance in comparison with CG increased in three of six speed strength abilities tests. The improvement was in the tests which are in nature similar to the exercises used in experimental programme, specifically bench press diagnostic series, 10 seconds maximal jumping test drop jumps diagnostic series (0.2 – 0.8 m). Therefore there can be presumed, that basketball training with the addition of speed strength stimulus effects speed strength abilities of upper and lower limbs more than the basketball training without a speed strength stimulus.

In dribbling slalom CG performance decreased by 0.09 ± 0.51 s and EG performance increased by 1.24 ± 1.00 s ($p < 0.01$).

In repeated rebound test CG performance decreased by 1.77 ± 2.42 points and EG performance increased by 9.36 ± 4.03 points ($p < 0.01$).

In wall pass test CG performance decreased by 0.38 ± 0.87 points and EG performance increased by 1.93 ± 1.49 points ($p < 0.01$).

In timed layup test CG performance increased by 1.38 ± 8.19 s and EG performance increased by 7.62 ± 10.57 s ($p < 0.05$).

In agility test, shooting from 4 meters test and free throws test there was not a significant difference between CG and EG.

There can be stated, that after participation in experimental programme in EG there was an improvement in skills tests characterised by high explosiveness. The exception was agility test which is explosive, but the reaction time might have played a more significant role than the speed strength abilities in this test.

We compared pre-tests and post-tests in EG. The speed strength abilities tests in which there was significant increase in performance were correlated with skills tests. Tab. 1 shows the significant correlations: 10 seconds maximal jumping test (h) and agility test, bench press (15 kg) and dribbling slalom, barbell squat jump with 22.5 kg resistance (P) and dribbling slalom and finally barbell squat jump with 22.5 kg resistance (h) and timed lay-up test. It is presumed, that agility test correlated with 10 seconds maximal jumping test, because also in agility tests there are needed repeated explosive movements of lower limbs. The correlation of bench press and dribbling slalom might be explained by the need of explosive movements of upper limbs in the conditions of a dribbling slalom. The correlation of jump height and power output in 22.5 kg barbell squat jump with dribbling slalom and timed layup test can be explained by explosive character of both tests.

Similarly to Ondruš (2002), our results confirmed significant increase in performance in 10 seconds maximal jumping test after application of plyometric training. Khelifa et al. (2010) and Matavulj et al. (2001) found that plyometric training increased performance level in squat jump and countermovement jump; however those result were not confirmed in our research. According to Erčulj et al. (2010) players of higher performance level achieved higher level of performance in drop jump test from 0.2 m height when compared to players of lower performance, which can be compared by our results in drop jumps diagnostic series. Similarly to our research Sekulic et al. (2013) confirmed significant relationship between agility and explosiveness of lower limbs. Dominic, Talabi (2012) determined significant dependence between explosiveness of upper limbs and layup test which was confirmed in our research. However these authors confirmed also dependence between explosiveness of upper limbs and shooting test and free throws test which was not confirmed by the data we obtained.

Table 1
Correlations of performance changes in speed strength abilities tests and skills tests in experimental group

	Free throws test [n]	Timed layup test [s]	Dribbling slalom [s]	Shooting from 4 m test [n]	Wall pass test [n]	Repeated rebound test [n]	Agility test [ms]
10 seconds maximal jumping test – h [cm]	-0.180	0.026	-0.324	-0.077	-0.024	-0.332	0.678**
Bench press – 15kg P [W]	0.217	0.220	0.620*	-0.181	-0.197	0.334	-0.361
Bar/barbell squat jump – 22,5kg P [W]	0.355	-0.007	0.543*	-0.323	-0.264	0.058	0.165
Bar/barbell squat jump – 22,5kg h [cm]	0.300	-0.606*	-0.154	-0.103	0.428	-0.006	-0.286

Key: * – Correlation is significant at the 0.05 level; ** – Correlation is significant at the 0.01 level; h – height; P – power output

Conclusions and Recommendations

There can be confirmed that application of speed strength stimulus which contained drop jumps, repeated jumps, hurdle jumps, acceleration exercises in natural and impeded conditions and upper limbs explosiveness exercises with medicine ball and player's own body weight. There also can be confirmed that the implementation of experimental programme improved basketball skills with explosive character, which was partly confirmed by correlation analysis. For future research we recommend determining the dependence of speed strength abilities and game performance, as well as the influence of age and sex.

Based on our findings there can be recommended that the basketball coaches or strength and conditioning coaches in youth female basketball include exercises for development of speed strength abilities into the training process, in particular the usage of plyometric exercises, drop jumps, repeated jumps, hurdle jumps, acceleration exercises and medicine ball exercises. Coaches are advised to concentrate more on the performance quality of exercises than high number of repetitions. This kind of speed strength training should be included into training process at the end of pre-season period and should last for at least 6 – 8 weeks. It is also recommended to repeat this kind of intervention, preferably in the middle of playing season.

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RESUMÉ

ÚČINNOSŤ RÝCHLOSTNO-SILOVÉHO ZAŤAŽENIA NA HERNÉ ČINNOSTI JEDNOTLIVCA V BASKETBALE

Jaroslava Argajová, Tomáš Kampmiller

Basketbal je hra typická častými zmenami smeru a rýchlosti, neustálou akceleráciou a deceleráciou, vertikálnymi výskokmi a poskokmi a explozívnymi pohybmi horných končatín. Môžeme teda povedať, že rýchlostno-silové schopnosti sú pre výkon v basketbale jedným z limitujúcich faktorov. Cieľom práce bolo zistiť vplyv rýchlostno-silového zaťaženia na herné činnosti jednotlivca počas 8-týždňového obdobia 15-ročných basketbalistiek v kontrolnom (KS) a v experimentálnom súbore (ES), v ktorom pôsobil program zameraný na rozvoj rýchlostno-silových schopností.

V testoch rýchlostno-silových schopností, v ktorých bol rozdiel medzi prírastkami v ES a KS významný na 1% hladine štatistickej významnosti, dosiahla ES tieto zlepšenia: v diagnostickej sérii vo výskoku po zoskoku z 20 cm – $2,93 \pm 3,35$ cm, z 80 cm – $3,82 \pm 3,88$ cm, tlak na lavičke, odpor 17,5 kg – $14,34 \pm 18,14$ W. Na 5% hladine štatistickej významnosti: opakované vertikálne výskoky za 10 sekúnd (výška výskoku) – $1,42 \pm 2,21$ cm, výskok po zoskoku – 40 cm – $2,21 \pm 3,8$ cm, 60 cm – $2,79 \pm 2,42$ cm, tlak na lavičke – 12,5 kg – $18,84 \pm 17,06$ W, 15 kg – $12,62 \pm 21,55$ W, 20 kg – $16,24 \pm 18,8$ W. Na 10 % hladine štatistickej významnosti: opakované vertikálne výskoky za 10 sekúnd (výkon) – $0,66 \pm 1,96$ W/kg.

V testoch herných činností jednotlivca, v ktorých bol rozdiel medzi prírastkami v ES a KS významný na 1 % hladine štatistickej významnosti, dosiahla ES tieto zlepšenia: driblingový

slalom – $1,24 \pm 1,00$ s, doskakovanie na vytrvalosť – $9,36 \pm 4,03$ bodu, prihrávanie o stenu – $1,93 \pm 1,49$ bodu. Na 5 % hladine štatistickej významnosti: streľba po dvojtakte – $7,62 \pm 10,57$ s.

Na základe korelácie zmien sledovaných stavov v ES sme zistili významnú závislosť medzi výškou výskoku za 10 sekúnd a testom agility ($p < 0,01$), tlakom na lavičke pri odpore 15 kg a driblingovom slalome ($p < 0,05$), výkon v podrepe – výskoku s tyčou/činkou na pleciah s odporom 22,5 kg a driblingový slalom ($p < 0,05$) a výška výskoku v podrepe – výskoku s tyčou/činkou na pleciah s odporom 22,5 kg a streľba po dvojtakte ($p < 0,05$).

Rýchlostno-silový podnet mal za následok významné rozdiely v prírastkoch rýchlostno-silových schopností a vybraných herných činností jednotlivca v ES v porovnaní s KS. Korelácia potvrdila závislosť prírastkov vo výkone v rýchlostno-silových schopnostiach a herných činnostiach jednotlivca v štyroch prípadoch.

MOTOR FACTORS OF SPORT PERFORMANCE IN SYNCHRONIZED SWIMMING OF YOUNGER COMPETITORS

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Summary: In the work we present research based knowledge about the significance of motor factors in synchronised swimming performance and their hierarchy in two age categories of swimmers. The monitoring of motor and sport performance of younger pupils (n = 61) and older pupils (n = 45) showed a differentiated level of monitored factors. The sport performance was determined by monitored motor factors on 29, 5 % in younger pupils whilst the sport performance was determined at most by basic motor skills of synchronised swimming, showing itself in the technique of basic positions and movements in synchronised swimming in cooperation with condition abilities. In the group of older pupils, the estimated contribution to explaining the sport performance was on 61, 9 %. The highest rate of participation was in parameter throw with 2 kg ball from standing position as a factor of explosive strength.

Key words: Synchronised swimming, structure of sport performance, motor factors, age categories

Introduction

Definition of sport performance in synchronized swimming is challenging due to the multifactorial character of performance. The starting point for the examination of sports performance is the characteristics and analysis of individual determining factors, as well as clarifying the structure functioning of complex dynamic process. Several authors dealt with this issue (Havlíček, 1975, 1983; Košťál, 1984; Turek, 1990; Kampmiller, 1996, 2012; Záho-rec, 1995; Kyselovičová, 1997; Zemková, 1999; Laczo, 2006; Horseradish, 2006; Böhme-rová, 2007; Moravec et al., 2007; Hižnayová, 2009; Macejková, 2010; Broďani – Šimonek, 2010). When examining the structure of sport performance we have to take into account qualitative as well as quantitative side of the individual components. It is evident that there are links between determinants not only direct but also indirect, which act in terms of their specific significance. Synchronized swimming according to its sports performance of technical and aesthetic character is ranked among individual group of swimming sports. It presents the relationship between swimming competence with artistic impressions of ballet, dance, acrobatics and music. The spectrum of determinants of sport performance ranging in certain hierarchy in the structure of sport performance in synchronized swimming has already been introduced by some researchers (Chotina, 1983; Perfemov, Konenko, 1983; Evans et al., 1985; Kartašov, 1986; Reeves, 1986; Grey, 1993; Streitová, Labudová, 1999; Homma

et al. 1999; Ondrušová, 2002; Labudová, Zemková 2009; Labudová, Matúš, 2010; Labudová, 2011; Rodriguez, Zamora et al., 2012). Sport performance in synchronized swimming is in terms of motor characteristic is characterized by large numbers of motor skills and high automated complex motor structures. Motor factors which significantly decide on the victory according to official rules are demonstrated in the technical execution of the physical structure of an individual compulsory figures and competition routines. Based on the analysis of existing research results, the sport performance in synchronized swimming is significantly affected by:

- endurance abilities (general and special)
- strength abilities of the extremities and abdominal muscles (dynamic power, strength in endurance, endurance in strength explosive power)
- coordination abilities (balance, kinetic-differentiation , orientation, rhythmic)
- joint flexibility and agility (ankle, hip and shoulder joint, spine)
- factor of buoyancy
- swimming efficiency and universality
- level of technique

Competitions are realized in the compulsory figures and free routines, according to age groups 12 years of age and under (younger schoolgirls), 13 – 15 years of age (older schoolgirls) and 16 – 18 years of age (junior). In the senior group (older than 16 years) the girls compete in technical and free routines. Competitive events comprise solo (1), duet (2), team (8), the combination (10).

Compulsory figures are part of a sports performance in the lower age groups. Execution of compulsory figures is rather difficult because of maximal concentration. Compulsory figure requires performing a motion as a whole with maximum accuracy, technically correct, smooth and slow execution of dominants and with effort to perform vertical position to a maximum of the body height at the surface of the water. Duration of compulsory figures for all age groups is from 30 – 90 s, depending on the compulsory figure and individual sport performance of a competitor. Figure 1 shows an example of compulsory figure of younger age group.

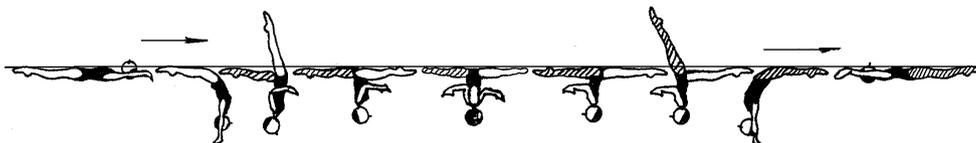


Figure 1

Younger age group

Sports performance subjectively evaluated by the panel of judges. Judges use a 10-point scoring system (Larfauoi, 1995), from 0 to 10 points with an accuracy of 0.1 points. Profiling of the top competitor in synchronized swimming can only succeed if the long-term systematic preparation starts at lower age group. By Šimonek et al. (1989) understanding the determinants of the structure of sport performance, their importance as well as possibilities

of the development in the long process of training allows to realize a rational choice not only talented athletes, but also to prepare an optimal plan and management long-term sports training.

The aim of the research was to find out the significance of motor sport performance factors in synchronized swimming and their hierarchy in two age groups. H1: In the category of younger female students, the highest levels of sports performance is determined according to their basic motor skill in synchronized swimming H2: The complex of fitness abilities in the sport performance, mainly explosive power, in the group of older schoolgirl will be to highest level determining factor.

Methods

Situational conditions were based on an overall plan (V, S) t0. Research has the character of quantitative research using ex-post-facto method. Two group of Slovak competitors in synchronized swimming participated in this research. Basic anamnesis of the samples are presented in table 1.

Table 1
History subjects

Competitive category	n	Age (years)	BW (kg)	BH (cm)	BMI	Sport age
Younger pupils (≤ 12 years)	61	11 \pm 0.4	42.6 \pm 13.9	153.9 \pm 16.1	17.9 \pm 2.2	3 \pm 1
Older pupils (13 – 15 years)	45	14 \pm 0.8	49.7 \pm 9.3	162.2 \pm 10.4	18.9 \pm 1.2	5 \pm 1

Measurement of motor performance was carried out 1 – 2 times a year for four years with a battery of motor tests in gymnastics gym and swimming pool (25 meters). The group of younger female students had to pass 12 tests in gymnasium and 4 tests in the pool and the group of older female students 11 tests in the gym and 5 tests in the pool. Sports performance consisted of points scored in compulsory figures according to the official score sheet in competitions in 2002 – 2005.

Selection of variables for multifunctional correlation, and stepwise regression analysis was conducted on the basis of equality, paired correlation coefficients, logical and empirical criteria. In the text and tables are labelled in the same way with the following characteristics: r – pairwise correlation coefficient; R – coefficient of multiple correlation; R^2 – coefficient of multiple determination; b – partial regression coefficient; Y – prediktant (points athletic performance); X – predictor (motor test); B_0 – constant member; S_{ey} – standard deviation of regression.

Results and Discussion

The level of motor factors and sports performance in younger schoolgirls are presented in table 2. Based on evaluation of the level of motor performance tests monitored in the gym we can state a differentiated level of endurance factor in dynamic strength, in explosive

power and static strength of the upper extremities, in the factor of joint flexibility. Differentiation of achieved performances in motor tests in the pool was noticed in the level of the swimming performance and technique of swimming style crawl, in special endurance as well as in basic motor skills of synchronized swimming (technique of arms sculling).

Table 2

Basic statistical characteristics – motor factors, younger pupils ($n = 61$)

Variable	Mean	Std Dev	Minimum	Maximum	Range	Median
SITR [cm]	3.75	5.65	0.00	19.00	19.00	0.00
SITL [cm]	4.20	5.61	0.00	20.00	20.00	2.00
SITS[cm]	7.36	6.16	0.00	24.00	24.00	7.00
BRIDGE [cm]	31.63	17.14	0.00	62.00	62.00	32.00
S-L (number)	49.95	8.54	33.00	68.00	35.00	50.00
THROW [m]	3.80	0.65	2.80	5.50	2.70	3.70
JUMPD [cm]	159.87	12.20	130.00	185.00	55.00	160.00
PLF [°]	6.62	2.00	1.30	10.00	8.70	7.00
DRF [°]	2.04	1.49	0.10	6.50	6.40	1.80
PULL-UPS [s]	40.70	22.09	7.00	94.00	87.00	41.00
JUMPH [cm]	27.17	3.66	20.00	34.50	14.50	27.50
STAND1 [s]	23.95	14.49	8.00	65.34	57.34	18.00
100 FS [s]	101.59	9.99	79.00	117.00	38.00	104.00
25 PH [s]	46.60	5.70	33.00	58.70	25.70	47.00
25 PN [s]	46.11	7.06	32.00	58.00	26.00	46.00
400 FS [s]	440.79	48.13	366.00	525.00	159.00	426.00
SP(points)	165.93	10.23	147.93	192.84	44.90	164.56

Legend: SITR – sit right leg forward, SITL – sit left leg forward, SITS – sit with legs split on, BRIDGE – bridge, SL – sit up lying down, THROW – throw the ball (2kg), JUMPD – jump off place into distance, PLF – plantar flexion of the ankle joint, DRF – dorsiflexion of the ankle joint, PULL-UPS – endure the pull-ups, JUMPH – jump off place to height, STAND1 – endure stand on one leg (eyes close), 100FS – 100 m freestyle swimming, 25 SCH – 25 m sculling (head first), 25 SCF – 25 m sculling (food first), SP – sport performance

The level of sports performance in compulsory figures according to an average point score was sufficient, which is consistent with the quantitative degree of 4.0 to 5.9 points. Individual diversity of the level of sport performance logically and empirically justify a differentiated level of motor performance, the degree of mastering the basic and special techniques of synchronized swimming as well as other internal and external factors.

Twelve factors of motor performance out of water were involved into multiple correlation and regression. We have found out that the determination of sport performance by

motoric factors which were monitored outside the pool was low with the share of 12.5 % (table 3).

Table 3

Multiple regression, correlation and step analysis of motor factors outside the pool, and sport performance in younger schoolgirls

Number of test	Variable	Ranking	b_k	R_k	R_k^2	%	%
T 12	STAND1	1	-0.1313	-0.174	0.0304	3	
T 4	THROW	2	-1.2552	-0.167	0.0279	2.8	5.8
T11	DRF	3	-1.6075	-0.139	0.0194	1.9	7.8
T5	PULL-UPS	4	-0.1005	-0.158	0.0252	2.5	10.3
T1,2,3,6,7 8,9,10	PLF. JUMPD. JUMPH. BRIDGE. SL. SITR. SITS						2.2
			$b_0 = 168.62427$			$R^2 = 0.1246$	
			$SEy = 25.90994$			$R = 0.352^{**}$	

Table 4

Multiple regression, correlation and step analysis of motor factors in water and sports performance in younger schoolgirls

Number of test	Variable	Ranking	b_k	R_k	R_k^2	%	%
T 15	25 SCH	1	-0.5537	-0.355	0.1263	12.6	
T13,16,14	100FS,400FS,25SCF						2.6
			$b_0 = 213.2657$			$R^2 = 0.1519$	
			$SEy = 17.1546$			$R = 0.398^{**}$	

Out of motoric variables which were monitored in the pool, sport performance was explained by variance of the level of variables up to 15.2 % (table 4). According to motor tests in the pool the highest determination of sport performance was found in the test 25SCH 12.6 %. Motor test presents the quality of basic motor skill in synchronized swimming, which was seen in the technique of the back layout position and movements (standard sculling). Standard sculling enabling the movement of the body towards the head is mainly used at the beginning and at the completion of the movement.

On the basis of the results we can confirm that some factors took over the importance of the other factors which was done by involving all variables in determining sport performance in synchronized swimming. It was proved that there is a transfer of motor abilities which were monitored out of water into abilities and skills observed in water. We can state that the determination of sport performance according to motor factors was 29.57 % (table 5). Regarding the variables included in this test, the coefficients of determination give us information on the highest estimated increase of variable of 25SCH 12.6 %.

Table 5*Multiple regression, correlation and step analysis of motor factors in younger schoolgirls*

Number of test	Variable	Ranking	b_k	R_k	R_k^2	%	%
T 15	25SCH	1	-0.692	-0.355	0.1263	12.6	
T 8	SITL	2	0.41356	0.185	0.0344	3.4	16
T 11	DRF	3	-1.4754	-0.203	0.0413	4.1	20.2
T 13	400FS	4	-0.0313	-0.145	0.0212	2.1	22.3
T1,2,3,4,5,6	JUMPD.100FS. JUMPH. THROW. PULL-UPS. BRIDGE.						7.3
7,9,10,12,14	SL.SITR.SITS.PLF.25SCF. STAND1						
			$b_0 = 213.22952$		$R^2 = 0.2957$		
			$SE_y = 14.62716$		$R = 0.544^{**}$		

From the results in the category of younger schoolgirls we can conclude that the highest levels of sports performance has determined the level of basic motor skills, which were seen in the technique of basic postures and movements in synchronized swimming with minimal involvement of the factors of joint flexibility, special endurance and the swimming performance. Our findings are confirmed in H1.

The results exactly indicate the difficulty to determine the motor factors explaining sports performance in youngest competition category. According to this fact we can conclude that regarding sports performance of younger age categories there is a considerable variability of compensation of one factor by another. Therefore, we believe that the growth of sports performance enables us better understanding of motor factors in the higher age groups more clearly.

In the group of older schoolgirls (table 6) as in the younger sample of schoolgirls we can point out to the differentiated level of motor performance in the factor of endurance in dynamic power, explosive power and static power of the upper extremities, in the factor of joint flexibility.

According to the test results measured in the pool it has been demonstrated level of diversity and versatility of the swimming technique of styles butterfly, backstroke, breaststroke, crawl, and special endurance and swimming efficiency as well as in basic motor skills in synchronized swimming (technique of sculling). Level of sports performance in compulsory figures, according to an average point scoring, was satisfactory, when evaluating the quality, which means that it is consistent with the quantitative degree of 5.0 to 6.9 points. In general we can state that there are some differences in the level of motor performance in older schoolgirls but we can observe a certain homogenization of the sample in terms of the sports performance level which was seen in the higher percentage of older schoolgirls (38 %) in identical scale of scoring of sports performance (SP) with an average increase of 185 points.

Table 6

Basic statistical characteristics - motor factors, older pupils (n = 45)

Variable	Mean	Std Dev	Minim.	Maxim.	Range	Median
SITR [cm]	0.67	5.87	-5.00	19.00	24.00	0.00
SITL [cm]	1.18	6.15	-5.00	18.00	23.00	0.00
SITS [cm]	5.64	6.67	-5.00	27.00	32.00	5.00
BRIDGE [cm]	24.82	16.75	0.00	53.00	53.00	22.00
SL (number)	51.11	8.79	33.00	67.00	34.00	52.00
THROW [m]	4.23	1.40	2.60	7.10	4.50	3.70
JUMPD[cm]	168.49	19.23	130.00	215.00	85.00	170.00
PLF [°]	4.89	1.58	2.00	7.50	5.50	5.00
DRF [°]	3.63	1.46	1.50	6.00	4.50	3.50
PULL-UPS [s]	63.44	18.11	30.00	104.00	74.00	62.00
STAND1 [s]	18.44	12.63	5.00	63.00	58.00	15.00
100M [s]	87.94	5.25	78.00	99.90	21.90	88.00
25 SCH [s]	43.73	6.68	34.00	65.00	31.00	42.00
25SCF [s]	43.16	8.65	30.00	62.00	32.00	42.00
100SK [s]	162.41	14.39	134.40	189.00	54.60	159.70
400FS [s]	390.64	45.75	330.00	485.00	155.00	378.00
SP(points)	186.45	11.78	160.95	213.89	52.93	184.42

Legend: SITR – sit right leg forward, SITL – sit left leg forward, SITS – sit with legs split on, BRIDGE – bridge, SL – sit up lying down, THROW – throw the ball (2kg), JUMPD – jump off place into distance, PLF – plantar flexion of the ankle joint, DRF – dorsiflexion of the ankle joint, PULL-UPS – endure the pull-ups, STAND1 – endure stand on one leg (eyes close), 100 M – 100 m Medley, 25 SCH – 25 m sculling (head first), 25 SCF – 25 m sculling (food first), 100 SK – special komplex 400FS – 400 m freestyle swimming, SP – sport performance

Eleven variables of motor performances out of water entered the multiple correlation and regression. We have found out that dispersion of sport performance was significantly explained by motor factors to 53.1 % (table 7). In terms of the included variables, coefficients of determination inform us on the highest estimated increase of explosive power with a share of 27 %, indicated by test THROW.

Table 7

Multiple regression, correlation and step analysis of motor factors *outside the pool and sport performance of older schoolgirls*

Number of test	Variable	Ranking	b_k	R_k	R_k^2	%	%
T2	THROW	1	7.18592	0.52	0.2708	27	
T6	SITR	2	-0.66046	-0.273	0.0746	7.5	34.5
T11	STAND1	3	0.14219	0.239	0.0572	5.7	40.2
T3	PULL-UPS	4	0.1803	0.213	0.0455	4.6	44.8
T9	PLF	5	0.794	0.171	0.0293	2.9	47.7
T4	JUMPD	6	-0.1771	-0.164	0.027	2.7	50.4
T5,10,1 7,8	BRIDGE. DRF.SL SITL.SITS						2.7
b0 = 168.5682 SEy = 19.84923					R ² = 0.531 R = 0.352**		

Dispersion of sports performance was significantly expressed by motor factors which were monitored in the water up to 18.5 % (table 8). In terms of the choice of variables, the most significant in sports performance was the factor of swimming performance and versatility (100M) and decided on sports performance at 14 %.

Table 8

Multiple regression, correlation and step analysis of motor factors *in the water and sport performance of older schoolgirls*

Number of test	variable	ranking	b_k	R_k	R_k^2	%	%
T13	100M	1	0.75322	0.375	0.1405	14	
T12	400FS	2	-0.03449	-0.142	0.0203	2	16
T16,14,15	100 SK. 25SCH. 25SCF						2.5
b0 = 140.3608 SEy = 42.78574					R ² = 0.1847 R = 0.429**		

The results suggest that the inclusion of all variables representing motor performance factors (table 9) was that the estimated increase to the explanation of sports performance reached 61.9 %. The highest contribution for explanation of sports performance was parameter THROW with a share of 27 %. We think that the motor test THROW with full ball does not represent only an isolated explosive power of upper extremities. Physical structure of the test requires rapid sequence involving multiple body segments and coordination of their involvement in the chain of motion activities, and informs us about the level of neuromuscular control too. Therefore it is considered to be as an indicator of general explosive power. Sports performance to a lesser degree was determined by the factors of swimming

versatility and technique of the styles butterfly, backstroke, breaststroke, crawl with 8.2 %; static strength of upper extremities with 8.2 %; flexibility of the hip joints with 5.1 %; integrated indicator of special endurance and special motor skills with 4 %.

Table 9

Multiple regression. correlation and step analysis of motor factors and sport performance of older schoolgirls

Number of test	Variable	Ranking	b_k	R_k	R_k^2	%	%
T2	THROW	1	5.19216	0.52	0.2708	27	
T13	100 M	2	0.55243	0.286	0.0819	8.2	35.2
T3	PULL-UPS	3	0.15854	0.286	0.0821	8.2	43.5
T6	SITR	4	-0.57228	-0.226	0.0513	5.1	48.6
T16	100SK	5	-0.20629	-0.199	0.0398	4	52.6
T5	BRIDGE	6	0.13603	0.164	0.027	2.7	55.3
T1,4,7,8, 9,10,11,12 14,15	DRF.SL.25SCH.25SCF.400FS.						6.7
	SITL.SITS.STAND1.JUMPD.PLF						
			b0 = 136.36127		R ² = 0.6193		
			SEy = 27.99812		R = 0.786**		

Calendar age from 12 to 15 years is known as progressive period of development of motion prerequisites in girls, especially strength abilities. In accordance with Zemková, Hamar (2004) behaviour of accompanying effects of natural ontogenetic development is typical according to changes of physical development and it is associated with changes in the level of fitness abilities. We believe that the growth of power parameters also indicate to systematic sports training and can be regarded as a manifestation of the general adaptation syndrome. The importance of general factor of explosive power is related to the requirement of sports performance in synchronized swimming, where performance of compulsory figures requires change the position of the body quickly and the segments in required height of the body on the surface of the water. Swimming versatility, special endurance and special skills of synchronized swimming in sports performance is related to the level of acquiring basic motor skills of synchronized swimming and is no longer sufficient for execution of performance, which is more demanding according to coefficient of difficulty of compulsory figures in older schoolgirls category. Joint flexibility in sport performance corresponds with higher requirements and demands of compulsory figures.

We can conclude that sports performance in the category of older female students is mainly determined by the complex skills of fitness. Proportion of basic motor skills of synchronized swimming, compared with younger schoolgirls has significantly decreased. The main part in terms of sport performance is fitness as a prerequisite for effective implementation of special motor skills. The main part in terms of sport performance is fitness as a prerequisite for effective implementation of special motor skills. Our results were confirmed in H2.

Conclusions

The results of research ascertained the determination significance of motor factors of sports performance in synchronized swimming and their hierarchy in two age categories. The research results indicate to proportionality of factors in terms of quality and quantity in relation to sports performance and their changing placement in terms of age. We have suggested the entropy and reverse processes in the genesis of structure of sports performance in synchronized swimming. In the category of younger female students we recommend to focus on versatile training activities (swimming technique and performance, gymnastic skills, ballet, acrobatics, development of joint flexibility). The content of sports training strongly focus on the acquisition of basic motor skills. In the category of older schoolgirls we recommend to increase the transfer of the versatile performance to the specific conditions of synchronized swimming. Expand the range of special motor skills of synchronized swimming. Develop power capabilities, preferably explosive power and level of joint mobility.

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RESUMÉ

**MOTORICKÁ ŠTRUKTÚRA ŠPORTOVÉHO VÝKONU
V SYNCHRONIZOVANOM PLÁVANÍ ŽIACKYCH KATEGÓRIÍ***Jana Labudová*

Výskumom prinášame poznatky o významnosti motorických faktorov športového výkonu v synchronizovanom plávaní a ich hierarchickom usporiadaní v dvoch vekových kategóriách pretekárov. Zistením úrovne motorickej a športovej výkonnosti mladších žiačok (n = 61) a starších žiačok (n = 45) sme zhodnotili diferencovanú úroveň sledovaných motorických faktorov. Determinácia športového výkonu sledovanými motorickými faktormi sa v mladších žiačkach preukázala na 29,5 %, pričom športový výkon najvyššou mierou určovala úroveň elementárnych motorických zručností synchronizovaného plávania prejavujúca sa v technike základných polôh a pohybov v súčinnosti s kondičnými schopnosťami. V súbore starších žiačok sa odhadovaný príspevok k vysvetleniu športového výkonu preukázal na 61,9 %. Najvyššou mierou sa podieľal parameter Hod 2 kg loptou z miesta ako faktor výbušnej sily.

SELF-ESTEEM IN PEOPLE WITH DISABILITIES

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Summary: Quality of life is an objective, but also subjective experiencing of your own health condition, in other words the health disability. The aim of the study was to extend the understanding of the selfassessment of people with disabilities. Authors tried to present the differences in selfesteem between individuals with hearing disabilities (n = 117) and physical disabilities (n = 186) using the Rosenberg Self-Esteem Scale. Analysis of individual self-assessment statements pointed to numerous representation of the positive statements in the group of individuals with hearing disabilities compared to the number of individuals with physical disabilities, with an average score of 29.85 points ($p < 0.05$). The most numerous consents were in statements: preserving human dignity, I have many good qualities. It is important to introduce stimuli for people with disability, which increase their awareness and self-esteem, and thereby to be active in different spheres of life, to create greater opportunities and stay more active in sports.

Keywords: individuals with physical disabilities, individuals with hearing impairments, self-esteem, self-respect, quality of life

Introduction

According to the methods used for reconsidering the quality of life are still important the preferences for adopting a subjective human survival and his appreciation of the various dimensions of life as an important indicator of real life (Labudová, 2012). It contains for example, the assessment of the perception of economic, housing, informational, health and other specific conditions reviewed by individuals (Votava et al, 2005). In case of people with disabilities, we expect, that the quality of life would reflect their specific ability of interaction with environment, the existence and perception of social support and the possibility of human involvement in the social process (Bláha, 2011).

We can observe reduction of available options and life chances caused by barriers, limited capacity for work, what makes disability negative affects to many pages of quality of life (Krhutová, et al, 2005). Sport activities are the medium for better understanding of many positive and negative aspects of life and for creating of educational and psychological basis of disabled people's life (Labudová, Vajcziková, 2009). Development of own life concept, self-esteem, the ability to distinguish individuality from the world, but also to be integrated into the life of the local environment and the wider society is the part of human development (Kukolová, Ješina, 2008).

An important manifestation of the individuality is to be able to cope with disability, finding your place and purpose in life. Bardiovský (2010) found that that after an accident 68 % of serious disabled people found themselves in a level of average life meaningfulness. Respondents also indicated their life as valuable and useful (40 %). Nemček (2011) in monitoring of the quality of life of older people using the SQUALA determined the importance of the relationship between social relationships and environment due to satisfaction with health status. In the question of the importance of physical activity was the same relation to physical and mental health.

The balance between the personal aim of life and objective life conditions, their influences and trends in the prospects is presented by optimal life satisfaction. The quality of life in the subjective point of view represents subjective experience in personal health status or health disability. Quality of life also reflects their involvement in employment opportunities. Global survey indicated that there is less employment of men with disabilities (53 %) compared to men without disabilities (65 %), similar to women (20 %), respectively (30 %). OECD highlighted that people with health disabilities are still disadvantaged in the labour market. Similar findings were reported in the case of poverty and higher levels of deprivation in this social group (Repková, Sedláková, 2012). All this can be reflected on selfassessment and evaluation of the meaningfulness of life. It is obvious, that only the sectoral coordination (health, social, local institutions) can provide adequate support for the life of people with disabilities and reduce their vulnerability. Active lifestyle, that includes implementation of regular physical activity, improves the quality of life of disabled people and the costs of their care and necessary social assistance (Nemček, 2012).

Specific and most serious problem of individuals with hearing impairments (the PHD) is the limitation of perception and capture incentives in the form of sound, which causes limiting the adoption of up to 60 % of information about life and society. Hearing is an important sense, which allows people to perceive speech, music, communication with each other and orientation in the environment. Hearing impairment or full loss of hearing creates in particular the problem of communication, reduced response to stimuli, but also changes in the vestibular apparatus (Syslová et al., 2003). In the quality of life of a person with a hearing impairment is attenuated aspect of social inclusion manifested by inferiority complex (Bartosik, Poor, 2000). Disabled people can transform this aspect into their self-esteem. Based on the hearing impairment an individual can experience different ways of emotions and reduction of cognitive processes. Man is tied to a specific reality, perceives general context and understanding of events heavier (Kukurová, 2005). As a result of sound deprivation syndrome, takes place the change in thinking and self-perception in life. Therefore the role of physical education and sport is to support learning processes of personal qualities, self-control and self-assessment (Labudová, 2010), as well as possibilities of education and self-improvement to cultivate a lifestyle followed by improving the quality of life. This process takes place while maintaining individual human values and with the acceptance of health, psychological, social, ethical, ecological areas of life (Kukačka, 2010).

Since 1990 it has been working the European organisation the FEPEDA. It is non-governmental organization, which was established to improve the quality of life of deaf and hard of hearing people, regardless their social and economic situation (<http://referaty.atlas.sk>). The company promotes cooperation, friendship, exchange of information between national federations of parents, children and youth with hearing impairments. Similarly, the activities of Dutch-French APAID organization are oriented to increase the quality of life of people

with disabilities in different countries (Kenya, Uganda, Mozambique, Senegal) through sport (Holubíková, 2011). The aim of the project is to empower the status of people with physical and mental disabilities, to enhance their self-confidence and skills.

The need to solve the research topics in terms of an individual with disability, includes the need to evaluate the personal satisfaction, ability to meet their own and social goals and conditions to create a real control of life. Nemček, Wittmannová (2011), to underline the development of self-knowledge, self-esteem, self-confidence as self-conviction about their own abilities, as he defines the self-esteem as the relation between personal achievements and personal demands. The ability of a man, the way he approaches the quality of his life is evaluated through the Rosenberg Self-Esteem Scale (1965).

The aim of the realised research was to increase the knowledge on the self-evaluation of selected issues of the life quality of people with disabilities, where we want to present self-esteem, and to see the difference between individuals with hearing and physical disabilities. The research was conducted within the project VEGA no. 1/0915/13 called "Sporting activities – part of the quality of life of people with disabilities."

From the aspect of self-esteem and the aspect of self-relationship to oneself, we can assumed that there would be a difference in the self-assessment of people with various disabilities with more positive opinion regarding the people with hearing disabilities in comparison to people with physical disabilities.

Based on the aim of study we set basic research tasks:

- collect and analyse the answers of respondents with hearing and physical disabilities, acquired through questions Rosenberg Self-Esteem Scale,
- process and compare positive and negative responses to individual items of the Rosenberg questionnaire among a group of respondents with hearing and physical disabilities,
- compare the overall level of self-esteem as an expression of the quality of life of respondents with hearing and physical disabilities.

Methodology

The sample included 303 respondents with a physical ($n = 186$) and hearing ($n = 117$) disabilities. Sample, consisting of PPD comprised 50.5 % men and 49.5 % women aged 15 – 29 years (54.3 %) (Table 1). The most common physical disability of respondents was amputation due devastating injuries and the impact of serious diseases (34.9 %), followed by cerebral palsy (28.5 %), progressive muscular dystrophy (18.8 %), paralysis after spinal cord injury (14 %) and congenital physical disability, such as spina bifida and sclerosis multiplex (3.8 %). Sample of PHD was represented by 44.4 % of men and 55.6 % of women aged 30 – 44 years (39.3 %). Most PHD was complete deaf (54.7 %), in the range of practical deafness was located 23.1 % of respondents and 22.2 % suffered from weak hearing. Majority of our respondents led a sedentary lifestyle (52.7 % PPD and 76.9 % PHD). The sample included 303 respondents with a physical ($n = 186$) and hearing ($n = 117$) disabilities.

We realised the given aim of study using a standardized Rosenberg Self-Esteem Scale (Rosenberg, 1965), which measures the overall level of global self-relationship to oneself. Rosenberg Self-Esteem Scale is one of the most widespread uni-dimensional methods with relatively good validity (Svoboda, 1999). The scale contains 10 items. Degree of agreement with each item is expressed on a four level scale from strongly agree up to strongly disagree.

High score indicates high self-esteem and low score indicates low self-esteem (Halama, Bieščad, 2006). Minimal achieved score is 10, the maximal of 40. We expressed the level of self-assessment using the averaged responses presented by the percentage of answers in scales and significance of the differences in the various statements between PHD and PPD was evaluated by Chi-square test. Differences in the overall level of self-esteem between PHD and PPD were evaluated by parametric t-test for independent selections.

Table 1
Percentage of the research sample from different perspectives

	PPD (%)				PHD (%)			
	Male		Female		Male		Female	
Gender	50,5		49,5		44,4		55,6	
Age (years)	15 – 29	30 – 44	45 – 59	60+	15 – 29	30 – 44	45 – 59	60+
	54,3	18,3	16,1	11,3	31,6	39,3	18,8	10,3
Sport participation in leisure	Active		Sedentary		Active		Sedentary	
	47,3		52,7		23,1		76,9	

Results and discussion

Using the 10 questions of the Rosenberg scale and the follow analysis of individual responses demonstrated a difference in self-esteem between individual evaluating of PHD and PPD, in seven items also statistically significant at the 1% level of significance. The sum of the point scores of all statements was 29.85 points in the PHD sample versus 28.83 points in the PPD sample. The score difference was statistically significant ($p < 0.05$), what confirmed the hypothesis of the existence of a larger number of people with hearing disabilities with more positive relationship to oneself compared to PPD. A more detailed analysis of individual items, which means the assessment of certain personal characteristics of respondents, we had a larger percentage of PHD (90,6 %) who had expressed more and concurring opinion with the feeling, that they keep the same personal dignity than other people (Table 2). Such affirmative expression of PPD (83.9 %) was lower but not statistically significant compared to the expression of PHD. This item confirmed the validity of the hypothesis.

Respondents' analysis about their good personal qualities (Table 2) also represent a greater frequency of up to 90.6 % in sample of PHD, but only 86 % in sample of CT and the difference between these two groups was statistically significant. We also received higher preference for positive answers in item of self-relationship in sample of PHD (88.9 %), comparing PPD (82.3 %). However, that in both the above questions there were clearer answer with full consent in the group of PPD (24.7 %, resp. 31.2 %) than in the group of PHD, and rather hesitant positive replies in numerous group of hearing-impaired (81.2 %; resp. 75.2 %) compared to the physically disabled. Both items confirmed the validity of the hypothesis with an emphasis on partly positive and completely positive opinion.

Table 2
Incidence of respondents to the individual statements

Evaluated item: sentence	Strongly Disagree		Disagree		Agree		Strongly Agree	
	PHD	PPD	PH	PPD	PHD	PPD	PHD	PPD
I am a person of worth, at least on an equal plane with others.	0	1,6	9,4	14,5	68,4	58,1	22,2	25,8
I feel that I have a number of good qualities.	0,9	1,1	8,5	12,9	81,2	61,3	9,4	24,7
I take a positive attitude toward myself.	0,9	2,2	10,3	15,6	75,2	51,1	13,7	31,2
On the whole, I am satisfied with myself.	0	2,2	15,4	24,2	74,4	52,7	10,3	21,0
I am able to do things as well as most other people.	0	4,3	8,5	22,0	49,6	50,0	41,9	23,7

Self-relationship to oneself and assessment of personal satisfaction with life was the verdict in favour of their positive opinion in greater percentage JSP (74.4 %) compared to respondents with disabilities (Table 2). Difference in summary statements agree and strongly agree between the groups in this item was statistically significant at the 1% level, and demonstrates the validity of the hypothesis. In this item of self-assessment respondents of PPD group were more critical by indicating the satisfaction with themselves in 26.4 %.

Similar percentage of PPD (26.3 %) disagreed with the ability to do things in the same way as other people (Table 2), which is certainly related to their physical abilities in other words with motor barriers which are connected with disability. 91.5 % hearing-impaired respondents expressed partly and full consent with the equality in comparison to other people. Full consent was nearly twice as numerous as in the case of PPD.

When analysing the first five statements we have found a higher percentage of respondents who expressed their consent as a partly one and full consent from the point of recognition of their good personal qualities (Table 2) compared to their negative opinion. These results allow us to conclude that a larger percentage of PHD compared to PPD respondents expressed by self-esteem their satisfaction with themselves and quality of their life, which confirms the hypothesis of monitored and analysed items. These results simultaneously indicate that PPD in these items it was expressed disagreement with an experiencing the relationship with oneself.

Analysis of next five statements, which have been designed with a negative offer, presented rather higher self-confidence in the group of PPD compared with PHD. Especially, in the individual statements we can conclude. Open expression of self-esteem was the answer to the question "I wish I could have more respect for myself". Disagreeing with the conclusions was presented by 61.3 % of PPD and 50.4 % of PHD (Fig. 1), that pointed to statistically significant difference between the samples at the 1% level of significance. Evaluation sounds as a modest one, possessing lack of courage and quietness of respondents with PHD, or PPD presents their satisfaction with the life and oneself in the current situation, but per-

haps without certain life ambitions. Effort for change for better life and relationship of oneself expressed PHD (49.6 %). This means in practice, to create greater incentives to self-esteem and activation of the PHD group to help them to appreciate and socialise themselves with their health problems and to find the sense of life.

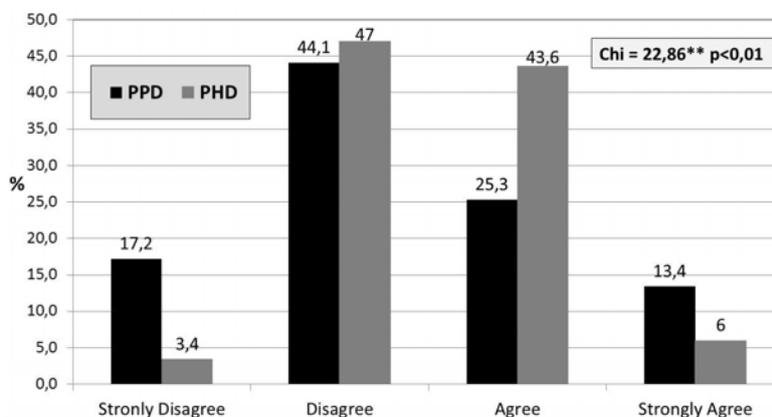


Figure 1

I wish I could have more respect for myself

Completed by the answers about pride of respondents (Fig. 2), 84.6 % respondents with hearing disabilities and 75.3 % with physical disabilities showed a favourable opinion that they could not be proud of themselves for anything. It is open criticism, and consideration for an unsuccessful person. That finding between groups is statistically significant at the 1 % level of significance, and in both of these items, we can confirm the validity of the hypothesis.

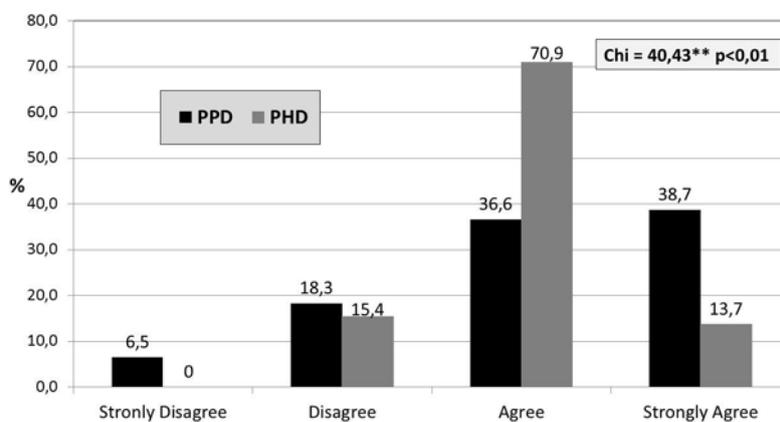


Figure 2

I fell I do not have much to be proud of

In the continuity to ability and disability of a man to solve, different situations, decisive factors are his steps against external powers towards the personal aims and take control over the situation. According to Labudová (2012), it is an expression of confidence, the perception of self-control, as well as own participation in various activities, and understanding in social relationships. When processing the answers of respondents, we can compare, the respondents suffering from serious health disabilities, were expressed in their self confidence, awareness of their self control as a well as their own activity in different activities and understanding them according to social relations. We believe that the wider range of free time opportunities could help to increase the self-esteem of respondents so they could find the balance between life's goal and objective conditions that people with disabilities could have more activities to gain new experiences.

The feeling of occasional uselessness was presented by 87.1 % compared to 50.6 % PPD (Fig. 3). Loss of sense of life, underestimating the personal capabilities and expressing of personal inability was presented by 86.3 % PHD and only 59.2 % PPD (Fig. 4). This difference is statistically significant at the 1% level and confirms the validity of the hypothesis, because the JSP expresses higher agreement with their uselessness and an inability compared to PHD.

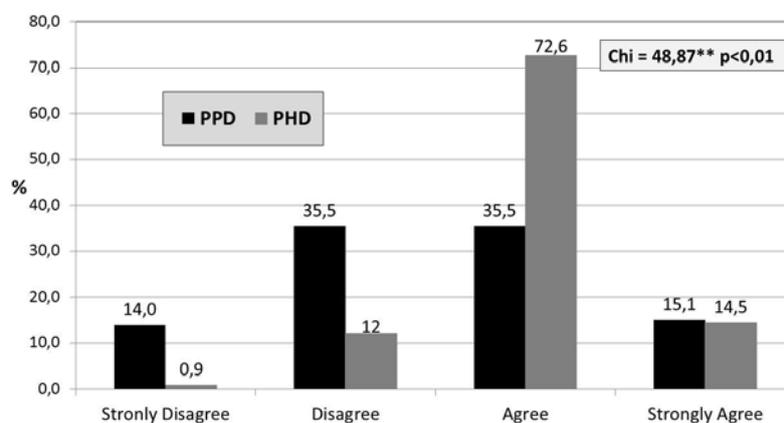


Figure 3

I certainly feel useless at times

This finding did not surprise us, because not only PHD, but also PPD are struggling in life with multiple barriers. In practice, it is an incentive, because expression of helplessness, lack of control over the events of own life may be accompanied by a gradual loss of motivation deficit of procedures, can often lead to the emotional closure. Therefore, the prevention focused on instructional, educational and social initiatives will have a great sense to their future life.

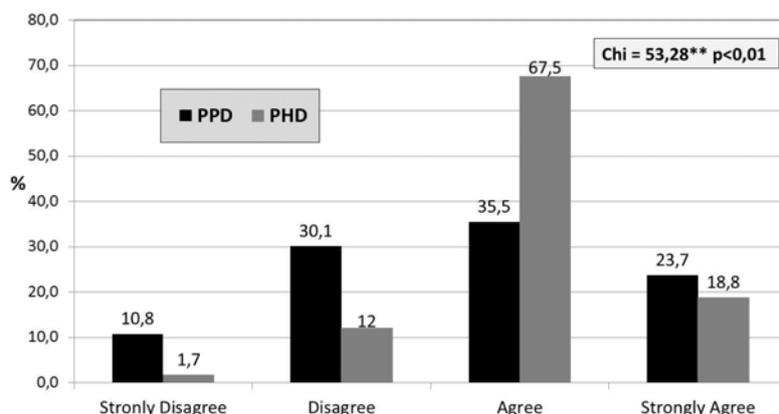


Figure 4

At times, I think I am no good at all

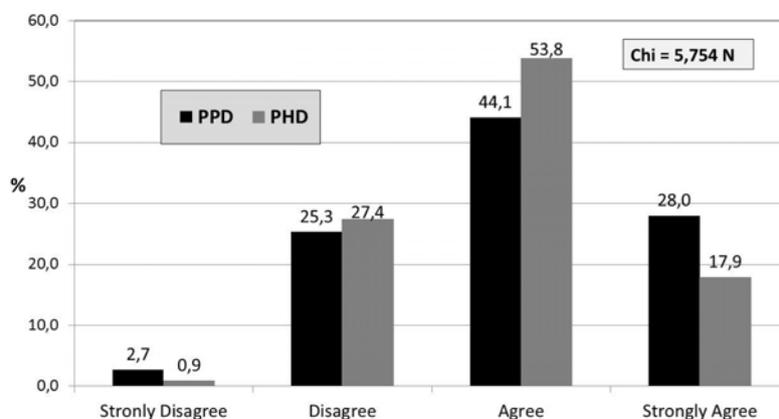


Figure 5

I am always inclined to feel like an unsuccessful person

Remarkable dominance of the responses was caught up to the question: "I am always inclined to consider myself as an unsuccessful man" (Fig. 5). Partly positive and strongly positive statements represent the manifestation of human deprivation of 72,1 % PPD and 71.7 % PHD. Only 28 % PPD and 28.3 % PHD is not considering himself for an unsuccessful man. There is not statistically significant difference between these groups and this article does not confirm the hypothesis the greater percentage of PHD compared to PPD. In this respect, it shows an opportunity to concentrate efforts to take active part in the sport activities, because several studies indicate on inspiring stimulus in item of meaningfulness of life (Sabová, 2012).

Conclusion

Implemented research has indicated differences in self-assessment among respondents with hearing and physical disabilities. Positive evaluation of self-relationship experience of oneself, positive expression of self-esteem expressed a greater percentage of PHD in comparison to PPD. PPD expressed higher percentage in item of self-assessment. The results allow us to express following recommendations:

1. To adapt psychological and social perceptions of life, the educational process should be more intensive.
2. Provide more often incentives to life of disabled people to raise awareness and self-esteem and their activation in different areas of life.
3. Prepare the objective conditions for life of the disabled so that they can gradually come up the balance with the goal of their life.
4. Create more opportunities for mobilization of people with disabilities in leisure and sports.

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RESUMÉ

SEBAHODNOTENIE ĽUDÍ SO ZDRAVOTNÝM POSTIHNUTÍM

Dagmar Nemček, Jela Labudová, Natália Oršulová

Kvalita života je objektívne, ale aj subjektívne prežívanie vlastného stavu zdravia, resp. zdravotného postihnutia. Cieľom výskumu bolo rozšíriť poznatky o sebahodnotení ľudí so zdravotným postihnutím, čím sa autorky pokúsili prezentovať sebaúctu s diferenciou medzi jednotlivcami so sluchovým (n = 117) a telesným postihnutím (n = 186) prostredníctvom Rosembergovej škály sebahodnotenia. Pozitívnejšie hodnotenie prežívania vzťahu k sebe vyjadriло väčšie percento jednotlivcov so sluchovým postihnutím oproti telesne postihnutým ($p < 0,05$). Do života zdravotne postihnutých jednotlivcov je potrebné zabezpečiť častejšie podnety na uvedomovanie a zvyšovanie sebaúcty, ich aktivizáciu v rôznych oblastiach života, predovšetkým vytváraním väčších príležitostí na aktivizáciu v športe práve v skupine ľudí s telesným postihnutím.

PHILOSOPHICAL AND ETHICAL REFLECTION OF SPORT IN THE CONTEXT OF SPORT HUMANISTICS

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Summary: In the Slovak Republic twenty years ago a creation of the new structure of the sport sciences began. The main segments of this system comprise sport kinanthropology, sport educology and sport humanistics. Within sport humanistics, philosophical research of sports and physical education is being carried out. Philosophical and ethical research solves its own, original and specific problems of the current sport. Philosophy and ethics of sport exist as an independent thought and scientific initiatives. However, in our conditions from organizational and scientific point of view, they are subsumed into the global scientific system of sport humanistics. The article defines the subject and the basic tasks of the philosophy of sport. It outlines new views on the problem of humanization of sport in contemporary conditions.

Key words: philosophy of sport, sport humanistics, humanization of sport

Introduction

During last twenty years of the existence of the differentiated system of sport sciences in the conditions of the Slovak Republic, the ability of independent, heuristic and creative research activity of the individual segments of this system (sport kinanthropology, sport educology and sport humanistics) has been verified. To certain extend the privileged position in the system of sport sciences and mainly within the sport humanistics, belongs to philosophical research of sport which is included in the competencies of the philosophy of sports. The listed subjects are the components of the sport humanistics system and simultaneously, they belong to the general system of philosophical disciplines. During this period, the concept of the subject of philosophy of sport and sport ethics is being profiled as one of the philosophical disciplines. In the following, we will concentrate on the specific issues and problems of philosophical and ethical research of sport.

1. The current role of sport humanistics

Sport humanistics is a scientific discipline which originated mainly as a consequence of the influence of the objective needs (spontaneous) social, sport and physical educational practice. Its establishment was conditioned by the intensive and extensive parameters of the development of sport. The need for humanism as an imminent attribute and value of sport is natural and internal need of most actors and holders of sporting activities. Multilateral human connections and the question of humanization, which corresponds with conceptions

of the relevant period, are the supporting line of all theoretical considerations about sports. In this context we can understand the existence of sport humanistics as a scientific necessity, because of human, cultural, spiritual problems of sport have become for others (exact, empiric) disciplines more or less strange, marginal, ununderstandable, incomprehensible, and perhaps even pseudo-problematic.

The genesis of sport humanistics has been influenced by many circumstances since its origin. It arose historically as a result and consequence of undifferentiated development of sport science (the sciences of sport). Due to the specification of scientific points of view on sport, the theoretical reflection of sport is constantly being expanded and getting more detailed. Scientific and theoretical researchers involved in sport science (športológia), due to a wide range of views in sports, do not understand each other exactly, despite the fact that they speak about the same and with the same expressions. Thus in humanistics it is about conscious systematization and definition of the principal terms.

The formation of sport humanistics has been a process (the thought movement) from syncretism to synthesis. Each science discipline aims at “postulation of quality of life, the ability to express a higher synthesis, so that it understands a philosopher, as well as a sport educologist, sociologist, kinantropologist, psychologist or sport psychologist” (Grexa, 1998). Therefore, it comes from the genesis of sport humanistics, its creative mission – to analyse the subject, to create new knowledge about the existence, it means about sport, to develop the methodology of its researches and to form an opposition to some scientifically incorrect opinions and streams, to decode various pseudo-theories, to compete with quasi-scientific and speculative tendencies in sport-humanistic thinking, on its own field and beside it.

The science is developed by people, usually with the assistance of creative invention, scientific methodology and scientific technique. Today we are at the stage where it is possible to personalize the process of establishing and developing the sport humanistics, although from the ethical point of view, it is important to talk about these issues in a very modest way. The theme of humanization of sport has been spoken very often and also by the people who have been not involved in the sport science professionally, such as the personalities of the Olympic Movement, outstanding athletes, coaches, managers, writers, artists and politicians.

Specific terminological and methodological tools of sport humanistics allow this scientific program to research the problems in sport and physical education in terms of their humanistic function. The theoretical fundament and starting point of the sport humanistics is based on several sciences, among which the social anthropology plays an important role. The subject of humanistic anthropology or humanology is a man, not only as an individual, but also as a kind of *Homo sapiens*, that means the whole mankind. It contains four basic areas:

1. Man as a proprietor and creator of values (ethical approach).
2. Man as a natural being (biological approach).
3. Man as a cultural being (civilization approach).
4. Man as a social being (social and societal approach).

These areas correspond to the four basic anthropological disciplines: general, biological, cultural and social anthropology – humanology (Wolf, 1993).

For the sport humanistics, philosophy of sport and sport ethics, the conception of humanism in current science, in anthropological and social thinking, has a basic importance.

This term in its general and universal human formulation is simultaneously enriched by stimuli of many sciences about man. The modern humanism in its theoretical and also practical initiatives has been searching for *new forms of the man's relationship to man, but also new forms of the man's relationship to nature*.

According to our opinion, these are the main levels of relations:

- Man to man, citizen to society, citizen to integration groupings and spontaneously emerging globalization structures. An athlete as a citizen and as a citizen of the world is a natural human component of these relations.
- Man to his own identity – we have in mind especially the search for personal identity in new conditions of national, international and global being. Also many athletes had to face to current conditions to find and strengthen their human and civic identity.
- Man towards his own personality – to his body, psychic, intellect and conscience. A very important role of an athlete during his sport and life mission is to build a relationship to oneself, to his physical, mental and emotional being.
- Man to nature, man to cosmos: this relationship comes through a known transformation of homocentrism to cosmocentrism. It is accented philosophically and metaphorically, that the “comeback” to nature, as a center of our being, is the comeback home. Finding our place in nature through sports is the finding of our place in the cosmos.

Today's modern sport, as a human activity, that has a serious impact on life, is implemented in artificial (urban) environment to a considerable extent. Today, mainly the top-athletes feel the loss of contact with the natural environment. But the contacts and mutual influences of social and sporting life have become stronger in all aspects. However I. Jirásek, the famous personality in philosophy of sport, believes, in this context, that primarily a long-term stay in nature “overcome social alienation of contemporary society... The stay (*the cited author has used the term “pobývání” in czech language – note from J.O.*) in natural environment allows an escape from the reification (*adopts an objective approach; transformation of a mental concept to the real thing: expressed mainly in speech, by a certain pathological behavior or that abstract concepts are understood as real objects*), the inner purification, *katharsis*, the recovery of temperamental and natural relationship to oneself, to others and to the world (Jirásek, 2005)."

Sport as a unit is in many ways a consequence, an initiator as well as a manifestation of the dynamics of life of contemporary man, the dynamics of change in today's world and transformations in the perception of humanism. In this regard, we are aware that one of the tasks of sports humanistics is to define extremely important terms *humanism* in sport and *humanization* of sport, especially in terms of the vocabulary of philosophy of humanism. Frequent motives of the philosophical reflections on sport are therefore humanistic forms, manifestations and consequences of sport and physical education for the existence of man and the universe. Their conclusions are naturally dependent on what is personally and at the same time socially acceptable to understanding of humanism in these days.

In this concept humanism should possess enough space for individual, social and environmental interests, and the assurances for present, and future must be included in it. Such

“sport” humanism has a character of real and equal right to “the fight”, the agon, and the struggle for themselves and for their interests. The world is not a garden of altruists and philanthropists. This is not inconsistent with the idea that humanism is a positive and prosocial thinking, because it does not admire and glorify the egoism, any of its real misanthropic forms, but besides it, does not spit upon a “reasonable” egoism. Until now, it has not become an archaism or anachronistic idea which sees a man responsible for everything or directs everything historical and human for the benefit of a man. It is also emphasized in apologetics of sport humanism, the idea that everything we do for sports, is in favour of a human being. The motive of humanism remains the good in its innumerable forms. The golden rule of humanism is the imperative. If you cannot do good to others, do not do evil consciously.

Sport is an important and influential social and human phenomenon of today. It has become the issue of the work time and free time by a large number of people. However, except the sympathizers it forms the crowds of antagonists and critics. All questions and exclamation marks of that period have influenced it. In this context we want to explain our understanding of some *basic aspects of humanistic role of sport*:

- Physical aspect – provides a wide range of options to create of the body an artwork, perfect and healthy structure. Aesthetically valuable proportionality of the body, health and beauty of the body are important and powerful motives to do sports.
- Vital aspect - sport expresses all secrets of life and vitality in sports, in physical education can be discovered and used in every form of activity and enthusiasm of human being.
- The aesthetic aspect – beauty and nobleness is significantly expressed and demonstrated through sport. Naturally, “the aesthetically valuable features of sport are neither necessary (in a constitutive sense), nor random“(Kobiela, 2013).
- The emotional aspect – the survival of the sport, sporting events and physical exercise reminds an active volcano of human feelings and emotional experiences. For example “pleasurable feelings of sports victory, achieved even by aggression allowed by rules, can be understood by this aspect as ethically positive” (Grexa, 2006).
- Moral aspect – sport in all performance levels gives you a chance for fair-play and honest way of life. Sport tests the moral strength of the person. "Here, the man treats the man within a fair play, respects the rules of competition, will help the rivals in need, in injuries, admits his mistake even at the cost of losing his chances of success, and victory. These are already the values, the principles that determine the behaviour of an athlete as a whole; they become the sense of his life "(Kasa, 2006).
- Spiritual aspect – a man can improve his sporting activities, his philosophical reflections about his own condition, about the world, about his life, about the transcendent values. "A lot of people mainly those who are spiritually based understand the movement or sport as a mean to relax and also as a catharsis from the high mental activity” (Hurych et al., 2013).

The most important, almost fateful and top sports theme resonates in this question: *Is a man a mean to one use?* Naturally, the holders of sport humanism are mainly the athletes – free, authentic and sovereign beings. But they should not handle their body arbitrarily as their everlasting possession. A famous saying claims that people do not have the body but people are the body.

In application to the athletes we have in mind especially more dimensional participation of sport in socialization of an individual through sport or other participation in sporting activities, and his "socialization" by maintaining all the positive original characteristics of the athlete's personality. We assume that sport humanistics as a subsystem of their superior social systems, can be inspiration: by H. Henderson, who refers "respecting the value of all human beings, their right to satisfaction of the basic needs and the same opportunity for their self-development" should be included to the basic principles of building the current new world order (Černík, Vicensík, Višňovský, 1997). We will elaborate this thought later but in another way. Basically, it is a detection of natural socialization functions of sport, always in new and social, natural and environmental conditions. It is also about searching for optimal socialization effects of sport and physical education on the man's personality considering his biological-somatic, mental, prerequisites of will and moral and natural social conditions of his existence.

In terms of outlined problematic it is necessary, in our opinion, to highlight the principle of consequentialism in methodology of sport humanistics and thereby supporting its authority. In other words, it is about its focus on consequences in sports (human, socially moral and esthetical, political, ecological, juridical and others), on a research of these consequences. Today, the emphasis, according to pragmatic and utilitarian approach to sport "the results" (victories, points, time, records) are more important than "the consequences" in sports in every sector (unattractive game for spectators, moral deformations and damaged health), because "the result" is related to the life of all its actors, according to the spirit of today's life "here and now", it affects the quality of their current material beings. In ethical thinking, this methodology has the attribute of theological (the aim is what the process of activity and means are implicitly subordinated). There is an immediate time sequence between action and result, but the consequences (either good or bad, but mostly bad) become evident mainly in the future, that means later, and that looks like they have not touched them at all (and also us).

The question concerning the subject of sport humanistics needs to be solved in a very broad context, with respect to other fields of science and social life and in global dimensions. Quite obviously we need to accept the request of hominization of human relations and to spread of democracy from the political sphere to the field of sports. In this context we speak about the new architecture of a democratic future of sport.

In our opinion, it is also necessary to change the social and theoretical *look at physical and sports education* as a school educational subject. First of all, it is inadmissible any discrimination in comparison to other school subjects. At the same time, it should be more consistently realized that physical and sport education in the literal meaning of words which compose the term; it is 'only' the traditional name of the subject. However, it aims at the whole human being, thus at the world of inner values of a young man. "The school physical education, the educational process is very specific, variable and complicated. It is because of the environment, wide content and general focus of the subject. It should effect on physical, functional, mental, intellectual and social development of a student. This fact that the educational aspect of education is no more or less important than the acquisition of knowledge, motion habits and exercise skills (Chromík, 2006)". Maybe we have to take care more about implementation of the principle of Komenský, the *schola ludus* (school by play), which has its mission also in today's physical and sport education.

2. The subject and tasks of philosophy of sport

The philosophy of sport (sports philosophy) and the ethics of sport, or sports ethics, have an irreplaceable role in scientific and philosophical study of sport, in the humanistic analysis of its mission and consequences. Philosophy and ethics of sport solve their own, original and specific problems of current sport and express their own knowledge in the aspects of overall concepts. Such as other views on sport – for example ecological, kinantropological, juridical, medical – also this philosophical view on sport is de facto irreplaceable. Generally, we can characterize the philosophy of sport like an effort to achieve basic, holistic and universal explanation of sport in current globalizing world. From the methodological, noetic (knowledge based) and general point of view, it is necessary to differentiate between philosophical and ethical view on sport, between philosophical and ethical sport analysis. The results of philosophical researches have mainly general knowledge and methodological value; they are expressed in the most general terms of sport terminology. The results of ethical researches have a general form from the moral point of view, but they have also a normative value, they lead to creation of concrete sport ethical norms.

Philosophy of sport and ethics of sport exist as a relatively independent thinking and scientific discipline. In our conditions, these disciplines are included according to organizational, problematic and scientific point of view, into more general scientific system of sport humanistics and as we have already mentioned, they form a part of the system of sport sciences. In the terminological aspect, philosophy of sport respects the terminology of sport humanistics and simultaneously the terminology of (general) philosophy.

From the scientific point of view, the philosophy of sport is defined as a new scientific discipline, which has been expanding by local conditions only during the last decades of the 20th century, and which has become from the traditional west philosophy of sport and culture of body. So far there is no unified concept of philosophy of sport and also for this reason that it cannot rely on a unified understanding of philosophy. Our concept accepts such philosophical schools that broadly accent and interpret science as a dominant cognitive phenomenon of mankind and sport as a man's value of kinetic cultural humanistic activity. Based on this, we can say that philosophy of sport is an applied scientific theory (subdiscipline) researching and explaining the general fundament and genesis of sport, human message, general human and social connections of sport and the patterns of existence and evolution of sport.

The theme “the subject of philosophy” is naturally connected with the topic or rather a question, whether the sport is a worthy issue of philosophical thinking. Whether the sport is even worth of the philosophy's interest? Those authors who have a positive and agreeing approach to already mentioned topics believe that the sport of every aspect of its existence is not only suitable but also necessary subject of philosophical thinking. Without a philosophical interpretation, the interpretation of sport would be highly reduced and would have less importance.

Nowadays, in relation to the societal and individual importance of sport, with regard to its importance in ontogenesis and phylogeny, it is impossible to “ignore” the sport philosophically. In science, we have to become reconciled with “establishing and accepting the sport issue as a philosophical relevant problem” (Šmidkeová, 2006). Today, the thoughts about sport competition as a gateway to philosophy of culture and a source of creativity, that cul-

ture has not been a descendant of work, but a daughter of sport; have become a public secret. Sport has been an attractive and remarkable theatre of world.

The subject of philosophy of sport has been a scale of a variety of essential, elemental and immanent problems of sport – the aim of sport, its role in life of a man and society, its effect on cultivation, humanization and forming the personality of an individual, value and coherence of sport, understanding the sport as an enthusiastic form of motion, affinity of sport and human characteristics. It is therefore a basic and general aspect of sport in term of humanization of man and sport itself. In the philosophy of sport, the complex of knowledge about sport is concentrated, synthesized, systematized and generalized by the general philosophical terms (compare also Korček, Blichá, 1995).

We can state exactly, that beside the subject of philosophy of sport, there is a sphere of problems:

1. manifestation of attributive features of sport, existence of sport (ontological point of view):

- playfulness (the term by J. Huizinga “homo ludens”, the playing man),
- competitiveness,
- performance (philosophy of performance),
- civilized motion of human body.

2. research of sport as a human phenomenon (humanological point of view):

- sport as an accomplishment of man,
- sport as a sense of life,
- sport as a form of human communication,
- analysis of sport language.

3. value aspects of sport and sporting (axiological point of view):

- man as a “shared value” of particular sport disciplines,
- value contribution of sport to the quality of human being,
- value experiencing of sport and sporting activity.

4. general point of view of mutual relations of sport, society and nature:

- sport, social, physical and mental health of society,
- sport as a cultural anthropological phenomenon,
- environmental coherences of the sport development.

Philosophy of sport is now engaged as a theoretical reflection of the sport as well as sport and coexistence of essential system of components. At the same time, the philosophy of sport understands the pragmatic and hermeneutical level as a communication mean among professionals who deal with sports research, as a mean for understanding the changes that sport goes through in these times, as a general communication terminology in professional discussions. In this respect, they develop philosophical cognition of sport in particular the representatives of analytical philosophy and philosophy of language.

Philosophy of sport has its own specific; today we can say historical resources, including undoubtedly the philosophy of game (as a significant feature of all cultural human acti-

vities). The classical concept of this philosophy was created by J. Huizinga. This author believes that "culture occurs in a form of game; that the culture is played at the beginning. The culture and game as one unit, the game is a primary, objectively perceived reality, while the culture is only a sticker accredited by our historical judgment" (Huizinga, 1990). Huizinga connects the game with the sport or the sport with the game explicitly and also implicitly. We add that a game is in the philosophical word meaning a basis of each sport discipline. The connection of "culture with game needs to be searched for the higher forms of social game, where this consists of organized activity of one group or community, or two antagonistic groups" (Huizinga, 1990). Even the competing and performing "do not stem from the culture as an amusement, but rather precedes it. If a game is good-looking, the value for the culture is immediately given" (Huizinga, 1990).

In sports in general and especially in the sports game, a philosophical, scientific and human truth via very specific forms of communication is presented. The scientific truth, as it is known, is formed by empirical (quantitative) and also qualitative (theoretical) researches. It originates on the basis of particular (concrete) scientific disciplines and its validity is analogically "restricted" only for the objects or features, which are the research subjects of given sciences.

To illustrate already mentioned words we can give an example – this is just a philosophical interpretation of games and sports games. The philosophical truth is walking towards this interpretation. A path to it leads through the qualitative researches. "The qualitative research has sense exactly because it is able to describe the context, the background, the horizon, the unit" (Hogenová, 2005). Such interpretation allows a dialog (in a sense of conversation) between the representatives of specialists from the field of game theory and it allows the theorists of various sports games to get involved into the dialog. The term game and the game itself have namely a communication function. "It opens the access to non-subject contexts, horizons, units, overlapping; the game has a transcendental function. The units we are part of, are present during the game, and they are experienced very intensively. An individual has improved, developed and changed his behaviour in the game" (Hog nova, 2005)". Every sports game, even every sport discipline, is a creative activity. Every player is permanently exposed to the necessity to create; it means to evaluate the situation quickly and to react just as quickly to create new solutions of the situation. In these horizons and connections he reveals the truth about himself and his player's qualities.

The truth of game in a general meaning is its human essence. In this context it is expressed, for example, the freedom of the player. "A player is coming out of anticipation, which is permanently determining our action and decision in a common everyday life" (Hogenová, 2005). In this sense the game liberates us from "we have to" based on the experiences. "The rules of the game or the desire for victory are not the anticipations of that kind, which manage our daily schedule and the course of our life activities" (ibid). When we look at the problem even deeper, we can agree on with another thought of the cited author. Namely, the anticipations which control us fully in a normal mode, they have no importance in game; the game is creating its own world. "A game brings space of authentic freedom, uniqueness to our consume society" (Hogenová, 2005).

Analogously we think in terms of school physical education in the context of game. Based on the theoretical and also on her own empirical research, Štefaničiková, the author who is also the active working teacher of physical and sport education confirms that "If we

want to preserve the spontaneity during the games in physical education lessons, we cannot overload the activity with didactical goals and strictness. When we see the boys playing basketball outside on the street, we see that everyone is playing. Also those who are only watching are involved into the game. They look like passive, but from the inner side they are very active participants. They have made their own decisions about the participation in the game. They changed the rules of the game after the mutual agreement and they follow the rules voluntarily – to resign from the game or to finish the game depends on their own decision" (Štefaničiaková, 2006).

Some counterarguments can appear against this philosophy of the game in sport and physical education. We live in a time, programmatically and systematically organized, in which everything is predetermined. For example the athletes together with their coaches are trying to learn by practice "the game situations" that should create the readiness to react to the play, the game processes, and the situations which are typical and repeated. It is considered to be "dangerous" to increase the intensity of the drill, because the creativity which is regarded to be very important is declining. In the game, there must be some space for a chance, which can be happiness for the game itself. "And a circumstance is actually the beginning of the action, which cannot be prepared in advance and it does not matter whether we rely on it. It is important to experience it in its originality; we wait for this originality, and it is welcomed. This circumstance makes the football match that rewards us with a gift which is a holder of joy" (Hogenová, 2005).

Conclusion

The present existence of the new conception of sport sciences demonstrated the potency of discovery and contribution of each segment of system of the science. The sport humanistics has been building and progressively defending its non substitutable status. The existence of sport humanistics creates appropriate organizational and also experimental environment for the development of knowledge of different sport aspects through the methodology and terminology of the particular partial social and human sciences with an attribute of sports. Mainly the philosophy of sport and sport ethics has been bringing new knowledge on human dimension of current sport. Thanks to the philosophy of sport, the existential problems of man as a citizen and athlete are getting to the centre of attention.

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RESUMÉ

FILOZOFICKÁ A ETICKÁ REFLEXIA ŠPORTU V KONTEXTE ŠPORTOVEJ HUMANISTIKY

Josef Oborný, Barbora Vrtiaková

Pred dvadsiatimi rokmi sa v Slovenskej republike začala kreovať nová štruktúra systému vied o športe. Hlavné segmenty tohto systému tvoria športová kinantropológia, športová edukológia a športová humanistika. V rámci športovej humanistiky sa uskutočňuje filozofický výskum športu a telesnej výchovy. Filozofický a etický výskum športu rieši sebestať, originálne a špecifické problémy súčasného športu. Filozofia a etika športu existujú ako samostatné myšlienkové a vedecké iniciatívy. V našich podmienkach sú však z organizačného a vedeckého hľadiska subsumované do všeobecnejšieho vedeckého systému športovej humanistiky. Článok vymedzuje predmet a základné úlohy filozofie športu. Načrtáva nové pohľady na problém humanizácie športu v súčasných podmienkach.

THE CAUSE OF DEATH OF PEOPLE DROWNING IN THE SLOVAK REPUBLIC

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Summary: The paper deals with the issue of a risk level of water environment focusing on the number of drowning in Slovakia during the years 1991 – 2010. It statistically evaluates and analyzes the number of drowning victims over the 10 year period in terms of the nature of the water surface, the most common causes of drowning and specifies the major causes of drowning.

Key words: drowning, water rescue, recreational activities, floods, swimming

Introduction

Slovakia is a landlocked country in Central Europe. It has an area of 49.035 square kilometres and it is a home of approximately 5.43 million inhabitants. It borders with Czech Republic, Austria, Poland, Ukraine and Hungary. The capital and the most populous city is Bratislava.

Despite the fact that it has characteristics of landlocked country, Slovakia is a country with many rivers, natural and artificial water areas and lakes. From hydrological point of view and usefulness of recreational activities of population in this country, it has 252 registered indoor swimming pools, 49 774 km of rivers, 7 518 km of irrigation channels and 338 natural and artificial water reservoirs, where only 10 of them is covering an area of 190 square kilometres. (Lauko, 2003).

Methods

This paper uses the analysis of an official protocol of injuries in water environment reported during the period of 1991 to 2010. Mathematical statistics and interviews of the rescue participants and questionnaires of members of the Fire rescue service, Police Force and Water Rescue services were also used. The authors used the information provided through electronic media data (www).

1. Life guard training in Slovakia

Several individual and legal entities deal with the issue of water rescue services in Slovakia. Their focus is on the training of the lifeguard and provide water rescue according to the requirements of the tenants or the owners of swimming pools or other recreational water surfaces. The only accredited institution for training of lifeguards is the Water Rescue Ser-

vice of the Slovak Red Cross (VZS SČK). According to the accreditation at the Ministry of Education, the VZS SČK can offer the following training levels that allow the trainees to watch over swimming pools and open water surfaces. The levels are as follows:

1. level – Bronz – Water Rescue in swimming pool.
2. level – Silver – Open Water Rescue.
3. level – Gold – The head of Water Rescue Service (SČK).
4. level – Instructor of Water Rescue Service.
5. level – rehabilitation and regeneration pools and tubs lifeguard with a maximum depth of 130 cm.

The training of swimmers – lifeguard training is realized as a form of course and it offers both theoretical and practical water rescue skills. They are aimed at highest and optimal swimming and physical skills of the trainees. The training is actively focused on using of the skills and applying these in variable, life threatening situations. The educational process focuses on gaining a general knowledge of lifeguarding according to the variety of different swimming pools, attractions and other water surfaces (Baran, 2004).

2. Legislative of Water rescue services in Slovakia

Due to the continuity of training methods of national Water rescue service organisations, there are some differences in the legislative that every lifeguard needs to know and strictly follow. These regulations are specific for each resort or water surface.

Several laws, notices and directives, which do not completely meet the needs in this area, direct the activities of Water rescue services in Slovakia. In March 2013, an adjustment to the current Law no. 355 about swimming pools took place in the legislative. It finally solved the problem of the number of lifeguards so that:

- at least one lifeguard should watch over two non-swimming pools,
- at least one lifeguard should watch over a 25 m pool,
- at least two lifeguards should watch over a pool of 25 m +,
- at least one lifeguard should watch over the landing at a water attraction.

However, there is an absence of a similar law as the Law on mountain rescue, which exactly specifies the rights, and responsibilities of the lifeguards as well as the visitors (Baran, 2006).

3. The aims and duties

The aim of the research

We can state that death caused by drowning reached the second highest statistic rating closely after the car accidents. As a result, we decided to carry out an analysis of the number of drowning in Slovakia during 1991 – 2000 and 2001 – 2010 according to the characteristics of the water surface and try to propose improvements to this situation.

Tasks of the research

We specified the following tasks according to the aim of our work:

- D.1** To administer and analyse the number of drowning during 1991 – 2000 and 2001 – 2010 according to the most common causes of death.

D.2 To administer and analyse the number of drowning during 1991 – 2000 and 2001 – 2010 according to the character of the water surface.

D.3 Work on a proposal to lower the number of deaths.

Results

The most common causes of drowning in Slovakia

As can be seen from the graph (figure 1), when we singled out the category "other causes" (wells, sewers, septic tanks, waste pits, drowning as a cause of accidents or criminal activity, etc.) the dominant factor is alcohol. It is necessary to say, that the main contributors to this factor (bars, restaurants, hotels, etc.) do not financially support the VZS. However, they are a part of recreation at swimming pools and other water surfaces. The combination of alcohol, high outside temperatures and individual physical predispositions are very different in a water environment (in extreme cases, the difference between water and outside temperature can be as much as 20 °C) and can result in a crisis.

Comparing the statistics during the years of 1991 – 2000 and 2001 – 2010, we can state that the number of alcohol related drowning decreased. This can be seen because of intensified VZS activities. It is important to state that comparing to the period before 1989 the cooperation of state and city police rapidly improved and excessive alcohol consumption is now strictly dealt with (Hučko, 2010).

Due to flooding, a growing number of drowning during 1991 – 2001 was recorded. These cases cannot be foreseen and are mainly related to the actions of an individual in a crisis. Saving one's property often influences rational decision about one's life. Floods also cover large areas and so it is very difficult for rescue services to act immediately...

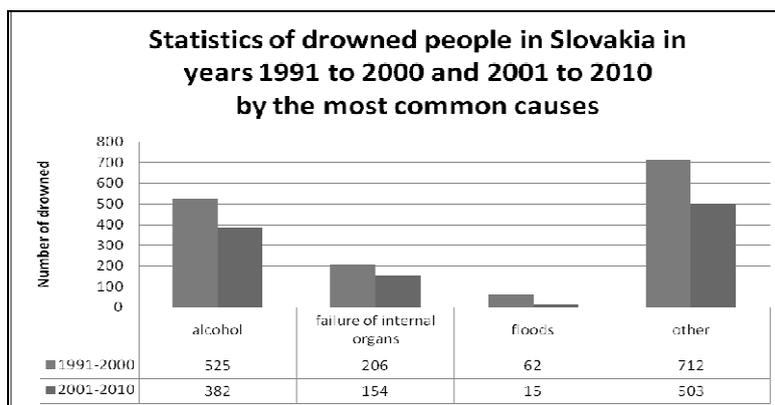


Figure 1

Number of drowning in Slovakia during 1991 – 2000 and 2001 – 2010 according to the most common causes

Drowning according to the character of the water surface

The character of the water surface also determines the risk level in water environment. Hydrological conditions of flowing waters present entirely different danger in comparison to those in swimming pools or other water surfaces. This is mainly because of the speed of the flow, different depth, obstacles under water, lower temperature (in most cases) etc. These factors present potential danger. Still waters present different risks and are mostly related to the size of the water surface. Changes in weather can result in waves that can vary from few centimetres to 1.5 m and can endanger the swimmers (figure 2).

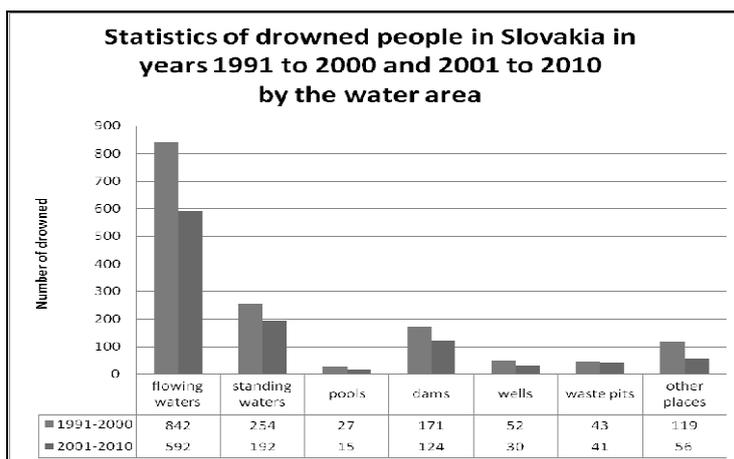


Figure 2

The number of drowning in 1991 – 2000 and 2001 – 2010 according to the character of the water surface

When comparing the number of drowning in Slovakia during 1989 – 1996 and 1997 – 2004 according to the character of the water surface (figure 3), it can be concluded that, with the exception of flowing waters, the number of drowning decreased. One of the main factors for this trend is more than 1 300 active members of VZS working at these water surfaces. As far as flowing waters are concerned, it is financially and individually impossible to cover all the localities with qualified lifeguards.

The lowest number of drowning took place in swimming pools. This is because of the norm that requires the owner to ensure the safety and health of people by qualified lifeguards of the Water rescue service.

Proposal of basic precautions to lower the number of drowning

The activity of VZS differs from activities of basic rescue units that are usually sent to deal with a specific situation around the country. The greatest problem with the interaction of FZS in the Integrated Rescue System (ICS) is the legislative. Their activities usually

differ from those of the basic rescue units though there are some similarities with those of the Mountain Rescue Service.

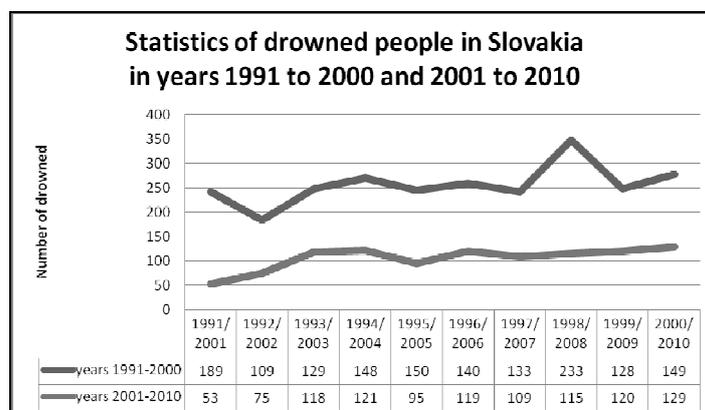


Figure 3

Comparison of drowning in Slovakia during 1991-2000 and 2001-2010

There as in an absence of a law in the legislation which defines the rights and responsibilities of the members of VZS, the financing or belonging to one of the resorts of the government (Home office or the Ministry of Health). The Mountain Rescue Service, for example, has such a law in the legislation. It would be more effective, transparent and applicable for the practice to join the individual directives into one legal standard, which would complexly solve the problems in competences, activities and organisational structure. One of the main reasons for such a high number of drowning can be seen in the insufficient number of swimming trainings during primary and high schools (Šimonek, 2010). However, the problem should be perceived in a wider context, which shows inadequate materials and personal approach in physical education in Slovakia. In his research, Šimonek (2010) observed that 96 % of primary schools in cities and 96.51 % in the countryside do not own a swimming pool. Furthermore, 87.5 % of schools in the cities and 97.65 % in the countryside do not have the appropriate conditions for swimming activities. Compared to other countries, the situation is critical. One of the main factors contributing to the high number of drowning can be attributed to the limited teaching of swimming during the first years of primary school as swimming classes that took place in the 3rd year had to be stopped due to economical reasons. One of the warning signals about this step form the Ministry of Education came from the Ministry of Defence, where more than 35 % of applicants for the army in 2004 were considered non-swimmers.

Conclusion

It is important to focus on this issue and try hard to improve the statistics of drowning in Slovakia. This can be achieved by:

- increasing the number of swimming pools, recreational water surfaces and facilities,

- starting to teach swimming classes in the 3rd year of primary school,
- saving lives and preventing accidents because of well qualified rescue person,
- education focused on swimming, water sports and the consequent,
- improving the legislative norms of recreational swimming activities to reach the norms of other EU countries.

We are aware of the breadth of the methodology and we are planning a more complex analysis of the problem and adding of characteristics such as age and sex.

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RESUMÉ

PRÍČINY ÚMRTÍ ĽUDÍ UTOPENÍM SA V SLOVENSKEJ REPUBLIKE

Igor Baran

Príspevok sa zaoberá problematikou rizikovosti vodného prostredia v zameraní na počty utopených osôb na Slovensku v rokoch 1991 – 2010. Na základe obsahovej analýzy úradných protokolov, osobného rozhovoru s účastníkmi záchranných akcií a štatistického vyhodnotenia údajov Vodnej záchranej služby, Hasičského záchranného zboru a Policajného zboru SR vyhodnocuje a analyzuje počty utopených z hľadiska charakteru vodnej plochy, veku a najčastejších príčin. Špecifikuje hlavné príčiny utopenia sa.

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