# DIFFERENCES IN MOTOR ABILITIES BETWEEN KARATE ATHLETES AND NON-ATHLETES

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***Abstract***

*Since physical education is inadequately represented by the number of hours in a school curriculum, teaching approach is realized with the low energy component, which is a major problem in realization of program tasks. For this reason, there is an increasing number of children who are involved in the training process in sports clubs or sections of physical education in schools. The aim of actual research was to determine the motor abilities of subjects, i.e. karate athletes and non-athletes and determine if there is a statistically significant difference. The sample consisted of 52 subjects (24 karate athletes and 28 non-athletes), aged 11-12 years ± 6 months, regularly participating in the school physical education classes. Measuring instruments for motor abilities evaluation were the tests of: (1) explosive strength; (2) segment speed; (3) repetitive strength; (4) coordination. For the statistical analysis and interpretation of the results, the statistical package Statistics 8.0 was in use. Results were expressed by descriptive statistics, while in aim to calculate significant differences between mean values of motor abilities between karate athletes and non-athletes, T-test for small independent samples was in use. T-test results in relation to the motor abilities, showed statistically significant difference in favor of karate athletes in the tests of explosive strength i.e., standing long jump (MSDM .011), triple jump from the stationary position (MTRS .000) and quintuple jump from the stationary position (MPTS .000); repetitive strength i.e., trunk lifting on the Swedish bench (MDTK .000), mixed ups (MMZG .000) and squats (MČUČ .000) and in two tests of coordination i.e., agility in the air (MOKV .000) and coordination with the bat (MKOP .006). In order to assess and monitor the development of the motor abilities in children it is necessary to provide reliable data, which creates a good basis for the results at a later age, as well the basis for taking any corrective intervention in the practical realization of the exercise program.*

***Key words****: motor abilities, karate athletes, non-athletes, differences.*

## INTRODUCTION

Since physical education is inadequately represented by the number of hours in a school curriculum, teaching approach is realized with the low energy component, which is a major problem in realization of program tasks (Višnjić, 2006). For this reason, there is an increasing number of children who are involved in the training process in sports clubs or sections of physical education in schools (Sallis, 1997). It was found that children athletes significantly differ in certain motor abilities from children of the same age who are engaged in physical activity only through the classes of physical education, i.e. non-athletes. Training process in karate should have an individual, that is personalized approach in regard to the development of abilities and characteristics of each athlete. Therefore, it is necessary for a coach to determine development model of the current anthropological characteristics of each athlete or group that would be appropriate for individual characteristics, age, gender and conditions in which the training process is implemented (Bompa, 2006). Managing the transformation process in karate (Sertić et al., 2006, Dick, 1997; Bratić & Nurkić, 1996; Ćirković & Jovanovic, 1992) is effective if there is a feedback, which provides two-way exchange of information, i.e. from the coaches to the athletes and from the athletes to the coach. In this purpose, it is necessary that the coach has information on the status of athletes with whom the training process is being conducted. The effectiveness of planning and programming of training process with a karate athletes depends on the following factors (Vidranski et al., 2009; Durakovic, 2008, Milanovic, 2007; Željaskov 2003): 1) determining the initial state or a relatively homogeneous group in the area of the most important anthropological characteristics and motor abilities; 2) determining the desired final state in accordance with the requirements of program content and the capabilities to achieve the desired state at the appropriate time interval, 3) correction of the program under influence of feedback, following the analysis of existing transit (intermediate) state of karate athletes. The aim of actual research was to determine the motor abilities of subjects, i.e. karate athletes and non-athletes and determine if there is a statistically significant difference.

## METHODS

Determination of differences in motor abilities between karate athletes and non-athletes was realized by the transversal approach. The sample consisted of 52 subjects, of fifth and sixth grades of primary schools in Niš, male, aged 11-12 years ± 6 months, regularly participating in the school physical education classes. The sample was divided into two sub-samples: the first sub-sample consisted of 24 subjects (karate athletes), body height 152.08±7.77 in cm (Mean±Std.Dev), body weight 43.75±13.05 in kg (Mean±Std.Dev), who were in addition to the regular physical education classes, three years and more actively involved in the training process of karate through additional classes organized by the school physical culture society. The second sub-sample consisted of 28

subjects, body height 152.00±7.95 in cm (Mean±Std.Dev), body weight 41.83±7.28 in kg (Mean±Std.Dev), who in addition to the regular physical education classes didn't practice some other sport activity. Measuring instruments for motor abilities evaluation were the tests of: (1) explosive strength, i.e., standing long jump, expressed in cm (MSDM), triple jump from the stationary position, expressed in cm (MTRS); quintuple jump from the stationary position, expressed in cm (MPTS); (2) segment speed, i.e., foot taping, expressed in number of cycles (double strokes) / 20 s (MTAN); hand taping, expressed in number of cycles (double strokes) / 20 s (MTAP), taping with feet against the wall, expressed in number of cycles (double strokes) / 15 s (MTAZ); (3) repetitive strength, i.e., trunk lifting on the Swedish bench, expressed in number of correctly performed lifting (MDTK); mixed pull ups, expressed in number of correctly performed pull ups (MMZG), squats, expressed in number of correctly performed squats (MČUČ); (4) coordination, i.e., agility in the air, expressed in tenth of a second (MOKV) coordination with the bat, expressed in a hundredth of a second (MKOP); agility on the ground, expressed in a hundredth of a second (MOKTL). For the statistical analysis and interpretation of the results, the statistical package Statistics 8.0 was in use. Results were expressed by descriptive statistics, while in aim to calculate significant differences between mean values of morphological characteristics and motor abilities between two independent groups, i.e., karate athletes and non-athletes, T-test for small independent samples was in use (Pallant, 2007).

## RESULTS AND DISCUSSION

Table 1.
Descriptive statistics of the motor abilities of karate athletes.

| Var. | N | Mean | Min. | Max. | Std. Dev. | St. Error |
|---|---|---|---|---|---|---|
| **MSDM** | 36 | 167.61 | 150.00 | 202.00 | 13.77 | 2.294 |
| **MTRS** | 36 | 495.28 | 400.00 | 570.00 | 38.73 | 6.455 |
| **MPTS** | 36 | 671.42 | 555.00 | 768.00 | 47.18 | 7.864 |
| **MTAN** | 36 | 32.64 | 23.00 | 42.00 | 4.61 | 0.768 |
| **MTAP** | 36 | 44.94 | 31.00 | 56.00 | 6.10 | 1.016 |
| **MTAZ** | 36 | 29.89 | 26.00 | 32.00 | 1.37 | 0.228 |
| **MDTK** | 36 | 25.22 | 12.00 | 42.00 | 6.60 | 1.101 |
| **MMZG** | 36 | 10.25 | 4.00 | 18.00 | 3.95 | 0.659 |
| **MČUČ** | 36 | 66.86 | 23.00 | 132.00 | 25.58 | 4.264 |
| **MOKV** | 36 | 12.88 | 10.80 | 14.60 | 1.07 | 0.178 |
| **MKOP** | 36 | 15.37 | 10.00 | 19.40 | 2.53 | 0.421 |
| **MOKTL** | 36 | 4.69 | 2.90 | 10.00 | 1.24 | 0.207 |

Table 2.
Descriptive statistics of the motor abilities of non-athletes.

| Var. | N | Mean | Min. | Max. | Std.Dev. | St. Error |
|---|---|---|---|---|---|---|
| **MSDM** | 36 | 159.20 | 123.00 | 183.00 | 13.49 | 2.248 |
| **MTRS** | 36 | 397.33 | 350.00 | 460.00 | 28.59 | 4.765 |
| **MPTS** | 36 | 479.42 | 422.00 | 590.00 | 32.16 | 5.361 |
| **MTAN** | 36 | 32.33 | 24.00 | 43.00 | 5.51 | 0.918 |
| **MTAP** | 36 | 47.08 | 33.00 | 58.00 | 6.01 | 1.002 |
| **MTAZ** | 36 | 29.53 | 26.00 | 32.00 | 1.48 | 0.247 |
| **MDTK** | 36 | 18.36 | 8.00 | 26.00 | 4.38 | 0.730 |
| **MMZG** | 36 | 5.75 | 0.50 | 12.00 | 2.96 | 0.493 |
| **MČUČ** | 36 | 35.89 | 22.00 | 62.00 | 9.83 | 1.638 |
| **MOKV** | 36 | 16.19 | 10.40 | 23.60 | 4.03 | 0.672 |
| **MKOP** | 36 | 13.04 | 6.20 | 23.30 | 4.29 | 0.715 |
| **MOKTL** | 36 | 5.09 | 3.40 | 7.50 | 0.87 | 0.144 |

T-test results (Table 3) in relation to motor abilities, showed statistically significant difference in favor of karate athletes in the tests of explosive strength i.e., standing long jump (MSDM .011), triple jump from the stationary position (MTRS .000) and quintuple jump from the stationary position (MPTS .000); repetitive strength i.e., trunk lifting on the Swedish bench (MDTK .000), mixed ups (MMZG .000) and squats (MČUČ .000) and in two tests of coordination i.e., agility in the air (MOKV .000) and coordination with the bat (MKOP .006).

Table 3.
The significance of differences between arithmetic means of motor abilities between karate athletes and non-athletes tested by T-test.

| Var. | Mean (karate) | Mean (non-athletes) | T-value | p |
|---|---|---|---|---|
| **MSDM** | 167.61 | 159.20 | 2.62 | **.011** |
| **MTRS** | 495.28 | 397.33 | 12.21 | **.000** |
| **MPTS** | 671.42 | 479.42 | 20.17 | **.000** |
| **MTAN** | 32.64 | 32.33 | 0.26 | .799 |
| **MTAP** | 44.94 | 47.08 | -1.50 | .138 |
| **MTAZ** | 29.89 | 29.53 | 1.07 | .287 |
| **MDTK** | 25.22 | 18.36 | 5.19 | **.000** |
| **MMZG** | 10.25 | 5.75 | 5.47 | **.000** |
| **MČUČ** | 66.86 | 35.89 | 6.78 | **.000** |
| **MOKV** | 12.88 | 16.19 | -4.77 | **.000** |
| **MKOP** | 15.37 | 13.04 | 2.81 | **.006** |
| **MOKTL** | 4.69 | 5.09 | -1.59 | .117 |

In the research conducted by Doder, D. et al. (2009) on a sample of 82 karate athletes, aged 10 to 14 years, it was applied 25 predictor variables, including 12 morphological, 12 basic-motor and one criterion variable, i.e., variable of situational-motional structure, with the aim to determine by usage the Regression Reduction procedure the influence of morphological and basic-motor variables on a around forward kick - mawashi geri in subjects. In addition, based on established prognostic validity, the aim was to construct the battery of measuring instruments for the assessment and monitoring of relevant parameters, the appropriate planning, programming and control of the effects of operational training process. Results of Regression Analysis showed that only a set of morphological predictor variables had statistically significant effect (p =. 02) on execution of around forward kicks. By using Reducing Stepwise Regression Analysis it was determined the greatest single influence on the variable shoulders width (p =. 00). By analysis of basic motor variables it was determined that statistically significant influence on the performance of around leg kick to the front had only endurance in half-squat with load (p =. 04). Usage of Stepwise Method within the Regression Analysis showed that the largest single predictor value had a triple jump (p =. 00), endurance in half-squat with load (p =. 02) and standing long jump (p =. 04). While determining the predictive validity by using Regression Analysis and application the Stepwise procedure, one can construct a battery of measuring instruments for diagnosis, assessment, monitoring and evaluating of performance in around leg kick to the front. Mentioned battery includes: shoulder width, triple jump, standing long jump and endurance in half-squat with the load. Authors Sertić et al. (2008) conducted a research with aim to compare the results of certain tests for the evaluation of the strength in three sports (judo, karate and boxing), which structures fall into the same group of activities (multi structural sports activities). By analysis of derived data, the conclusion is that the judo athletes dominated in the explosive strength in relation to the boxers and karate athletes, but there was no significant differences between judo athletes, karate athletes and boxers in the repetitive and static strength. Although the sample of subjects was relatively small, the reliability of conclusions can be based on the fact that all subjects were elite athletes and were competed for the national sport teams, as well as that the testing was done in controlled conditions equal for all subjects within the Diagnostic Center of Kinesiology Faculty in Zagreb. Authors Doder & Babiak (2007) in the research that included 19 male subjects, members of the senior national karate team of Yugoslavia, concluded that the dominant influence on achieving of top results in karate had explosive strength of lower extremities. Results of research conducted by the authors Vidranski et al. (2007) with the group of boys practicing karate (research included application of basic and specific situational-motor abilities), showed an insight about the quality, as well as possible adjustments of the training process. Certain tests for evaluation of basic and specific motor abilities did not show high correlation. Foremost, the test of speed of individual movement (MBFTAPF) did not achieve the expected significant correlation with the tests of speed of Mawashi geri kick (MMAVGEF) and Gyaku tsuki kick (MMGYTSUKF). The specific situation test of speed of Mawashi geri kick (MMAWGEF) achieved a correlation with the test of explosive strength of lower extremities, i.e., standing long jump (MFESDMF) of r = -0.46. The specific situation test of speed of Gyaku tsuki strike (MGYTSUKF) achieved a correlation with the test of explosive strength of lower extremities, i.e., standing long jump (MFESDMF) of r = -0.60.

## CONCLUSION

Realization of training process with young karate athletes is a specific transformation process in which the effects are achieved by adequate

implementation of program tasks along the adequate application of the training methods, scope and intensity of load in accordance with the individual characteristics of athletes. In order that coach could manage the process of training, determine the optimal load contents and forms of exercise and perform continuous control, he should be fully informed on the status of abilities and traits of athletes. Hence, in order to assess and monitor the development of the motor abilities in children, it is necessary to provide reliable data, which create a good basis for the results at a later age, as well the basis for taking any corrective intervention in the practical realization of the exercise program.

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# RAZLIKE U MOTORIČKIM SPOSOBNOSTIMA KARATISTA I NESPORTISTA

*Originalni naučni rad*

***Sažetak***

*Obzirom da je fizičko vaspitanje neadekvatno zastupljeno brojem časova u nastavnom planu, pristup nastavi ostvaruje se niskom energetskom komponentom, što predstavlja veliki problem realizacije programskih zadataka. Iz tih razloga, sve je veći broj dece koji se uključuje u trenažni proces u sportskim klubovima ili sekcijama za fizičku kulturu pri školama. Cilj aktuelnog istraživanja bio je da se utvrde morfološke karakteristike i motoričke sposobnosti ispitanika karatista i nesportista i utvrdi da li između njih postoji statistički značajna razlika.: Uzorak je sačinjavalo 52 ispitanika (24 karatista i 28 nesportista), učenika petog i šestog razreda osnovnih škola u Nišu, muškog pola, starih 11-12 godina ±6 meseci, uključenih u redovnu nastavu fizičkog vaspitanja. Merne instrumente za procenu motoričkih sposobnosti predstavljali su testovi za procenu: (1) eksplozivne snage; (2) segmentarne brzine; (3) repetativne snage; (4) koordinacije. Podaci su obrađeni deskriptivnom statistikom, dok je kao postupak za izračunavanje značajnih razlika između prosečnih vrednosti morfoloških karakteristika i motoričkih varijabli dveju nezavisnih grupa, karatista i nesportista, korišćen T-test za male nezavisne uzorke. Rezultati T-testa u odnosu na motoričke sposobnosti, ukazuju da statistički značajna razlika u korist karatista postoji u testovima eksplozivne snage: skok udalj iz mesta (MSDM .011), troskok iz mesta (MTRS .000) i petoskok iz mesta (MPTS .000); repetitivne snage: dizanje trupa na klupi (MDTK .000), zgibovi (MMZG .000) i čučnjevi (MČUČ .000) i u dva testa koordinacije: okretnost u vazduhu (MOKV .000) i koordinacija palicom (MKOP .006). U cilju procene i praćenja razvoja motoričkih sposobnosti dece potrebno je da se obezbede pouzdani podaci, čime se stvara dobra osnova za rezultate u kasnijem uzrastu, kao i osnova za preduzimanje eventualnih korektivnih intervencija u praktičnoj realizaciji programa rada.*

***Ključne reči****: motoričke sposobnosti, karatisti, nesportisti, razlike.*

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