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A COMPARATIVE ANALYSIS OF THE MOTOR ABILITIES OF CHILDREN WHO TRAIN APPLIED AIKIDO AND THEIR NON-SPORTING PEERS

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Abstract: The development of children in the pre-school age is characterized by the context of integrality, which means that the motor, physical, cognitive and conative aspects of child development are very closely related, and development in one domain influences development in another one. The mutual relations of motor and morphological dimensions depend on endogenous and exogenous factors, and especially on the gender, age and physical activity of children. The main goal of the current research was to determine the differences in motor skills between boys who are aikido practitioners and non-sporting boys. The sample of respondents in this study consisted of 60 respondents (30 boys - aikidoka and 30 non-sporting boys) aged 6. To assess the motor ability of the respondents, a battery of seven motor tests for adults that were modified and adapted for use on pre-school children was used. In statistical data processing, descriptive statistical analysis and Mann Whitney U were used to determine the differences between groups at the level of statistical significance $p < 0.05$. The results of the study showed that boys who trained aikido achieved statistically significantly better results in six out of seven tests for assessment of motor

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abilities. The boys of the examined age trained aikido for an average of two years, and thus it was therefore more likely that the effects of training would have greater effects on the motor skills of the respondents. The results obtained are not unexpected for the authors of the research because the training program used in the work with small aikidokas contains basic games, polygonal skills, exercises for the development of coordination, speed, strength and other motor abilities, and as such it the exercises were applied and perfected for many years in all applied aikido clubs..

Keywords: *motor abilities, morphological characteristics, boys, girls, pre-school age.*

INTRODUCTION

There are continuous changes in physical characteristics during the growth and development of children and young people, that is, body weight, shape and proportion of the body, as well as changes in psychological and physiological functions during ontogenesis. It should be noted that often growth and development are interchangeable, but they relate to different processes. Physical or somatic growth occurs due to hyperplasia, increase of the intracellular substance, and cell hypertrophy (Malina et al., 2004).

In order to enable the individual development of children, they should be provided with physical education which has the greatest impact on the development of the anthropomotoric skills of students. Anthropomotoric abilities can be said to represent universal effects as well as conditions that are needed in order to achieve certain efficiency by physical activity, characterized by a different intensity and degree of complexity (Nešić, 2002). Through physical education, children acquire knowledge of life, they form ethical values, learn to respect others, and develop team spirit, all through victories and defeats in the field of sports. Physical education enables the development of the mind, both body and mind, and therefore it is necessary to become more and more a basic teaching subject (Hardman, 2009). Also, research has confirmed that physically active students, or students who are active in sports, have a better status in their peer group (Gadžić and Vučković, 2009).

Small children cannot sustain high intensity training sessions or organized competitions, and in that sense it is very important to know the trend of development of preschool children motor abilities (Popović, Cvetković, Grujičić, 2006; Trajkovski, Tomac, Marić, 2014). Training programs in working with children must be focused on multifaceted sports development and not improving the skills of certain sports. Only professionals who know the sensitive phases of development should work with children, i.e. those who know the phases that are most suitable for the development of certain motor skills. The training programs should develop in accordance with the characteristics of the biological development of children (Bompa, 2005).

Since physical exercises, which are well selected and dosed, can be a stimulating factor in growth and development (Mišigoj-Duraković, 2008), this research has attempted to investigate the potential benefits of training applied aikido to pre-school children.

Applied aikido is a system of combinations of different martial arts designed for recreationists, and in addition to its primary purpose, which is defense against an opponent's attack, it is aimed to induce an improvement in the motor status of the practitioners. This skill contains techniques that inflict pain on attackers, as well as techniques that prevent the attacker from intending to inflict pain. The regular practitioners of aikido used are capable of responding

to a great number of different situations, as well as the attack by one attacker or more. Motor skills in children as well as in adults who exercise regularly are improving. Among other things, earlier research has shown a significant correlation of the static and dynamic equilibrium with the degree of adoption of techniques in aikido (Milosavljević et al., 2016). It is well known that only physically fit practitioners can realize the techniques they have learned, and therefore, as a special goal, the continuous improvement of all motor skills is emphasized: strength, balance, speed, endurance, mobility, and perhaps the most important, coordination.

The training concept of applied aikido is the work of master Radojica Spasović, a black belt holder at 9 Dan in Real Aikido, one of the best students of the master Ljubomir Vračarević, whose personal assistant he was for many years. This skill can be practiced by the youngest of children, as it does not develop aggression but positively affects their psychological status, developing self-esteem, and in the long-term, humanity, in the sense of not inflicting pain on others - only defense from attackers.

METHODOLOGY

Sample

The sample of respondents in the study consisted of 60 boys aged 6. Of the total number of respondents, 30 boys are active participants of the club of the applied aikido Uča, while the remaining 30 boys are from the pre-school Čigra in Zvezdara, not engaged in organized sports activities. The 6-year-olds from the club of applied aikido Uča actively trained for 2 years and have two training sessions per week. The boys from the pre-school, also 6, had no organized physical activity.

Variables

The research used a battery of seven tests to assess the motor abilities of pre-school children, and a detailed description with standardization and metric characteristics of tests was published earlier (Bala, 2002). The battery consisted of the following tests:

- Straddle seated forward bent
- 20 m dash test
- Plate tapping
- Polygon backward
- Standing broad jump
- Bent arm hang
- Sit-ups

Data processing method

The basic central and dispersion parameters were calculated for all investigated motor variables: arithmetic mean, standard deviation, minimum value, maximum value and measure of the variation width.

Considering that it was a small sample of subjects whereupon it was unrealistic to expect normal distribution, the Mann-Whitney U test was applied, as a test of nonparametric statistics to determine the differences between the groups of subjects.

RESULTS

Table 1. *Central and dispersion parameters of variables for assessment of the motor abilities of boys who train aikido.*

Variable	N	Range	Min	Max	AS	SD
Straddle seated forward bent	30	26.0	26.0	52.0	38.37	7.93
20 m dash test	30	1.87	4.04	5.91	4.82	0.39
Plate tapping	30	18.0	16.0	34.0	26.13	3.93
Polygon backward	30	22.92	13.30	36.22	19.63	4.67
Standing broad jump	30	46.0	111.0	157.0	132.67	13.36
Bent arm hang	30	14.6	11.1	25.7	18.27	3.90
Sit-ups	30	26.0	10.0	36.0	26.20	5.40

Legend: AS - arithmetic mean, SD - standard deviation, Min - minimum score, Max - maximum score, Range - difference between minimum and maximum result

By looking at the results in Table 1, we can conclude that in most tests, with the exception of the 20-m run with a high start, the standard deviation and range values indicate large individual differences in motor skills and, therefore, a reduced discrimination in tests, while the results obtained in the 20-m run test show slight differences between the best and the worst results, and thus, the obtained values are highly homogeneous.

Table 2. *Central and dispersion parameters of variables for assessment of the motor abilities of non-sporting boys.*

Variable	N	Range	Min	Max	AS	SD
Straddle seated forward bent	30	26.0	24.0	50.0	36.20	7.47
20 m dash test	30	1.62	4.34	5.96	5.22	0.40
Plate tapping	30	17.0	15.0	32.0	23.77	4.88

Polygon backward	30	22.0	16.0	38.0	27.32	5.97
Standing broad jump	30	65.0	75.0	140.0	106.53	18.82
Bent arm hang	30	23.4	4.9	28.3	16.2	43.5
Sit-ups	30	27.0	10.0	37.0	22.43	7.68

Legend: AS - arithmetic mean, SD - standard deviation, Min - minimum score, Max - maximum score, Range - difference between minimum and maximum result

By looking at the results in Table 2, it can be concluded that the values of the range and standard deviation in the standing long jump and touch-toe with feet spread, backwards polygon, trunk lift, static strength test and hand tapping indicate that there are greater individual differences in the manifestation of these motor abilities, which to some extent contributes to a less discriminating test, while the results in the running at 20m high start with low range values and standard deviation indicate a high homogeneity of the results obtained. These results and variations are expected for this age, characterized by the uneven differentiation of different motor structures. Standard deviations in the standing long jump and touch-toe with feet spread, backward polygon, trunk raising, static strength test and hand tapping tests indicate that there are greater individual differences in the manifestation of these motor skills, which to some extent contributes to a less discriminating test, while the results in the running at 20m high start test with low range values and standard deviation indicate a high homogeneity of the results obtained. Thus, these results and variations are expected for this age.

Table 3. Results of Mann-Whitney U test of boys who are training aikido and non-sporting boys aged 6.

Variable	Mann-Whitney U	Z	P	Arithmetic mean	
				Non-sporting	Aikidoka
Straddle seated forward bent	380.50	-1.03	0.30	28.18	32.82
20 m dash test	216.50	-3.45	0.01	38.28	22.72
Plate tapping	308.00	-2.11	0.03	25.77	35.23
Polygon backward	126.00	-4.78	0.01	41.30	19.70
Standing broad jump	132.00	-4.71	0.01	19.90	41.10
Bent arm hang	302.00	-2.19	0.03	25.57	35.43
Sit-ups	301.00	-2.21	0.03	25.53	35.47

Legenda: Mann-Whitney U - Mann-Whitney value test, Z-value, p-level of statistical significance.

The results shown in Table 3 clearly indicate that boys who train aikido achieved statistically significantly better results in six out of seven tests for assessment of motor abilities. Boys who train aikido were better at tests running at 20 meters high start, hand tapping, standing long jump, the static strength test, and trunk lift.

DISCUSSION

Motor skills are an important part of the overall growth and development of children. They can be defined as a group of certain characteristics inherent in human beings due to which man is able to perform a large number of motor tasks. One of the basic characteristics of motor skills is that they cannot be measured, but rather, evaluated, given their latency. Power, flexibility, accuracy, speed, coordination, balance and agility can be assessed both by field and laboratory tests. Testing motor skills can provide an insight into the current level of fitness level, but if tests are performed periodically, then progress can be checked by systematic training.

The aim of this research was to compare the differences in motor abilities between respondents who have no organized physical activity and those who do. The results of the research have shown that the 6-year-old aikido practitioners in the Uča aikido club have a high level in almost all motor abilities. The authors of the paper, despite maximum effort, found no research that dealt with the effects of practicing aikido on the motor abilities of preschool children.

The obtained results indicate that boys who train aikido achieved significantly better results in all examined abilities, except touch-toe with feet spread, with particularly pronounced differences in the use of small aikidoka in the coordination capacity (backward polygon and standing long jump). The results of the research greatly confirm the findings of the authors who were researching various physical exercises in pre-school children. In particular, similar results were obtained by authors who researched a special exercise program for pre-school children compared to children who failed to engage in physical activity (Kerić, Simić and Švraka, 2013).

Also, similar results were obtained in a previous study (Sabo, 2002) on a relatively large sample (N = 333) of pre-school age boys, in which a correlation between the duration of the exercise time with the level of motor abilities was established, which was recorded in the current research as 6-year-old boys spent at least two years in aikido training, as opposed to boys aged 5, without significant differences in most motor skills.

The results of this, as well as the above mentioned studies, point to the importance of programmed physical exercises in working with children, and the positive influence of the same on the motor status of children. The results of some previous studies that focused on the influence of organized physical exercises on the motor abilities of pre-school children (Matrljan, Berot and Mohač, 2015) confirm that organized physical activity significantly influences the motor abilities of pre-school children, which clearly states that it is absolutely necessary to start with organized physical exercise at an earlier age.

Physical education of an adequate intensity and content influences in a very stimulating way the development of anthropomotoric, functional and organic abilities, the results of previous research confirmed in practice. In pre-school age, organized physical activity gives a special contribution to the realization of tasks and goals of physical education in general (Višnjic, Jovanović, Miletić, 2004).

CONCLUSION

Taking into account the results of the research, as well as some previous research papers, the differences in the motor abilities of the respondents regarding the nature of physical activity have been clearly determined. Boys who trained aikido achieved significantly better results in six of seven tests for assessing motor abilities than their peers who were not involved in any organized physical activity.

Finally, it can be noted that regular training of applied aikido in boys aged 6 (active training for two years with two training sessions per week) significantly contributed to the improvement of all motor abilities and that the complexity of the kinetic structures applied in this skill contributed to the development of coordination in the examined age group of the boy in particular.

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