ADAPTED SWIMMING FOR CHILDREN WITH DOWN SYNDROME

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Every human being is born with the right to develop himself and his capabilities in the society. Sometimes, however, for one reason or another, one finds himself burdened with physical and mental illnesses that block his full development. Every child born with Down syndrome has the real opportunity to lead a full and fairly independent life as long as he is given this opportunity. Recently we are facing increasing base of evidences about the successful realization of these people in all areas of life – children successfully advancing in school, young persons with Down syndrome reaching university education, successful professional work and excellent achievements in sport. The application of adapted motor activities programs for persons with Down syndrome result in physical strengthening, development of motor skills and abilities, mental, social and cognitive development. Through sport participation, their personal development, self-confidence and integration into their peers' environment are strengthening. The aim of this study is to apply adapted swimming techniques to persons with Down syndrome in order to monitor the effects on their physical, functional and psycho-emotional abilities. Adapted swimming program was applied. Pre and post measures were recorded. To analyze the obtained data, we used signal method for evaluation and variation analysis. The analyses of the results are showing that the application of adapted swimming program on children with Down syndrome is influencing positively the following of the observed indicators: physical ability and psycho-emotional status.

Key words: children, Down syndrome, adapted swimming

Introduction

Swimming is a means for physical education and physical activity and when we speak about it, we associate it with an aquatic environment. Aqua activities lead many benefits for participants such as increasing adaptation skills, improving physical development, functional and physical condition. The significance of swimming can be considered in the following aspects: social, health, educational and applied (Nikolova, 2010; Lekina, 2003). Recent trends in complex rehabilitation have forced adapted swimming as a therapy and rehabilitation instrument for people with Down syndrome. Adapted physical activities in aquatic environment are used in purpose to facilitate significant acceleration in recreation and participation process of children with Down syndrome (Williams & Wright, 2004)

Aims and Objectives

The purpose of our study was to identify the changes in physical development, physical capability and psycho-emotional state of children with Down syndrome under the influence of specific means of adapted swimming.

Methodology

The research subjects are physical development, physical capability and psycho-emotional state of children with Down syndrome.

The research objects are the parameter of physical development and physical capability and their im-

pact of specific means of adapted swimming over these parameters.

The adapted swimming education program was conducted over 8 months. Ten children with disabilities (all boys) age 10 to 12 years with Down syndrome (**trisomy 21** nondisjunction) and without any preliminary swimming skills were selected to participate in the study. All swimming lessons occurred indoors (controlled environment) at school swimming pool sized (18 x 5 meters and average depths 1.0 meters) and water temperature $30.0\text{ }^{\circ}\text{C} \pm 1.5\text{ }^{\circ}\text{C}$. All tests were done by principal investigator in this study. We perform an assessment for effectivity of training process throughout the period of sports-pedagogical experiment. Testing method was based on 6 tests separated in 3 groups: test for reporting specific indicators, physical capability test and psycho-emotional development test.

We used the following methods to improve our aims and purposes: survey of specialized literature, diagnostics and testing, sports-pedagogical experiment.

To process the result of output data we used the following statistical and mathematical methods: analysis of variance, comparative analysis and a Sigma assessment method.

Results

The assessment was performed before and after the 8 months' period.

The initial assessment of testing group shows the entry level of their physical capability.

At the end of the researching period under the impact of the applied specific adapted methodology the tested parameters increased.

At the same time the average value of coefficient of variation (V) decrease. This is sign for decreasing of dispersion around the average level and improving the group's homogeneity over the surveyed indicators.

We applied Student's *t*-distribution to determinate the impact on ability of children surveyed on under the influence of used adapted methodology and to comper the credibility of the differences in the average values, with a high statistical credibility level $Pt \geq 95\%$.

- *Face submersion (s)*

Figure 1 shows indicator "Face submersion". The output average data for this indicator shows significant differences between output levels of the children. At the beginning $X=5,6$ s and at the and $X = 7,3$ s. At the end of the testing period, we can see that there is a tendency for increasing of average values according to the beginnings values with increscent 1,7s.

Figure 1. Increment of indicator "Face submersion"(s) of testing children - start-end.

- *Vital capacity (cm³)*

The output average data for "Vital capacity" shows significant differences between output levels of the children. At the beginning of survey $X= 678,00$ cm³ and at the and $X = 790,00$ cm³.

At the end of the testing period we can see that there is a tendency for increasing of average values with increscent 112,00 cm³. (Figure 2)

Figure 2. Increment of indicator "Vital capacity" (cm3) of testing children - start-end.

- *Static lumbar-endurance testing (s)*

The output average data of testing dynamometrical parameter shows significant differences between output levels of the children. At the beginning of survey $X=11,1$ s and at the end $X = 12,7$ s.

At the end of the testing period, we can see that there is a tendency for increasing of average values with increscent 1,6s. (Figure 3)

Figure 3. Increment of indicator "Static lumbar-endurance testing" (s) of testing children - start-end.

- *Static abdominal endurance testing (s)*

The output average data of testing dynamometrical parameter shows significant differences between output levels of the children. At the beginning of survey $X=14,2$ s and at the end $X = 16,2$ s.

At the end of the testing period, we can see that there is a tendency for increasing of average values with increscent 2,0s. (Figure 4)

Figure 4. Increment of indicator "Static abdominal endurance testing" (s) of testing children - start-end.

Lower limb explosive power testing

The output average data of testing parameter "Lower limb explosive power" shows significant differences between output levels of the children. At the beginning of survey $X=66,50\text{cm}$ and at the end $X = 76,70\text{cm}$.

At the end of the testing period, we can see that there is a tendency for increasing of average values with increment 10,20cm. (Figure 5)

Figure 5. Increment of indicator "Lower limb explosive power testing" (cm) of testing children - start-end. To revealed unique ability of each child, its results were assessed by Sigma method of assessment.

The estimates are immeasurable values but they enable us: a) to make a comparison of results of every single child in each tested parameter and b) to make a comparison of results of every single child in all tested parameters. Maximal assessment is 50points, average 25p., and minimal 0p.

Discussion

The result of applied adapted swimming methodology for children with Down syndrome shows that swimming activities are effective for increasing levels of physical capabilities and physical fitness. Similar statement is given by Winnick (1995). Also we observed improvement in their psycho-emotional state, brought by the joy from the swimming practices, increases self-confidence and facilitate the process of social integration. According to the results of our research, we suggest that adapted swimming methodology can be valuable tool in physical rehabilitation because of the satisfactory results achieved with children with Down syndrome.

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