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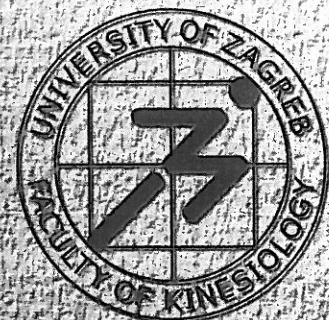
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CHANGES OF ANTHROPOLOGICAL STATUS OF CHILDREN IN WRESTLING SPORTS FOLLOWING A THREE-YEAR TRAINING-PROCESS

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Abstract

The presented work is the final work of a project named "Monitor of changes of children's anthropological status in wrestling sports", and its aim is to analyse changes of anthropological characteristics which are the result of active participation in the subjects' three-year training programme. The group of subjects was consisted of 30 athletes (11years old \pm 6 months at initial testing, and 14years old \pm 6months at final testing) who were engaged in wrestling sports (judo and wrestling) and who were tested at the beginning and at the end of the three-year training process. The reaserch consisted of a battery of 16 tests to evaluate anthropometrical characteristics, motor and functional abilities. The analysis of differences between initial and final status of the group of judokas and wrestlers points to statistically significant positive changes in all tests and it can be concluded with complete certainty that wrestling sports training positively influences on the development of the all analysed motor and functional abilities and to a great extent positively directs the morphological development.

Key words: judo, Greco-Roman wrestling, training, motor abilities, functional abilities

Introduction

Although the popularity of a sport probably does not depend on its dominantly positive influences on anthropological status but on the series of other factors, it is still necessary to prove all the positive aspects of training of judo and wrestling.

Already published research can point to the positive influence of wrestling sports training on the anthropological status. Sekulić et al. 2006 establish positive shifts at the 7-year old boys after nine months of training judo. In the research which includes judo wrestlers 11-17 years old, Jagiello, Kalina and Tkaczuk 2004, point to the progress in strenght after training in a preparatory period, and Clark et al. 1984, proves that wrestling training influences on the growth of strength at 7 – 9 year-old children.

This work is also going towards that direction, and as the final work of the project named "Monitor of changes of children's anthropological status in wrestling sports" has its aim to analyse the changes of anthropological characteristics at the subjects who finished a three-year training programme. The secondary goal was to define which part of the anthropological status was mostly enclosed during the three-year training process and which and how extensive changes happened in that segment.

Methods

The experimental group (30 subjects) was consisted of those athletes (17 judo wrestlers and 13 wrestlers) who started and finished the three year training process (in the period between their 11 \pm 6 months to 14 years \pm 6 months) in wrestling sports. The analysed group of subjects was only one part of the tested subjects who were included in the project "Monitor of changes of children's antropological status in wrestling sports" because unfortunately the specimen of the experimental group disintegrated, i.e. the children gave up on judo and wrestling training. The control group of the subjects in this research consisted of 28 (in the period between their 11 \pm 6 months to 14 years \pm 6 months) boys who were not doing any organized sports activity during three years except in PE classes.

A battery of sixteen tests (16) was applied in this research to evaluate:

anthropometrical characteristics (ATV – body mass, ATT – body weight, AOP – forearm circumference, ANN – upper arm skinfold), motor abilities, coordination, (ONT – agility on the ground, KUS – side-steps, MPN – obstacle course backwards), flexibility (MPR – sit-and-reach), speed of movement (hand tapping), power muscular endurance (MSD – standing broad jump), repetitive strenght (MPT60 – sit-ups, SKL60 – push ups, CUC- squats), specific endurance (BAC90 – throw+two push ups in 90 seconds), static muscular endurance (MIV – bent-arm hang), and functional abilities (F6- six-minute run). The judo wrestlers and wrestlers boys were tested by the battery of 16 tests and the control groups

were tested by 11 tests used in PE classes in Croatian elementary schools. The description of the standard tests for the evaluation of anthropological characteristics in education in the Republic of Croatia was provided by Findak et al. 1996, and the specific tests for judo and wrestling has already been described together with the mentioned project ("Monitor of changes of children's antropological status in wrestling sports", project number No. 0034214, main researcher prof.dr.sc. Sertić, H.).

The tests were conducted by educated measurers of the Faculty of Kinesiology.

The data were processed in the statistical package Statistica for Windows, version 5.0, using discriminative analysis, multivariate analysis of variance (MANOVA) and t-test for dependent and independent samples.

Results

Table 1. Discriminant function analysis results of experimental group

	d2	F	p
DF	32,62	29,53	0,00

Legend: d2 squared distance between the centroids of groups, F-validity of f-tests, p-error

Using discriminatory analysis the existence of statistically significant difference of the experimental group of subjects between the initial and final testing was established (table 1).

Table 2. Multivariate analysis of variance between initial and final testing of experimental group

VAR	INITIAL MEAN±SD	FINAL MEAN±SD	F-TEST RESULTS	P
ATV	153,277±7,6631	168,707±7,6136	257,31	0,00
ATT	44,603±9,8334	58,047±11,8848	145,18	0,00
AOP	21,517±2,1884	24,382±2,4085	142,79	0,00
ANN	12,087±5,0506	10,233±3,9819	6,05	0,02
MPN	13,846±3,3844	10,769±2,8665	51,59	0,00
MPR	55,333±8,0374	61,342±6,9424	15,28	0,00
MSD	173,133±18,8821	203,000±25,8950	106,93	0,00
MTR	26,867±2,6618	31,767±3,2022	68,55	0,00
MIV	32,271±19,3496	50,793±21,6507	40,09	0,00
MPT60	40,200±7,5265	48,567±7,7712	29,61	0,00
ONT	20,980±3,9892	16,242±4,9392	42,30	0,00
KUS	11,243±0,9630	10,202±1,0026	33,22	0,00
BAC90	12,033±2,7852	14,167±2,5200	16,82	0,00
SKL60	20,267±10,3722	32,833±13,1072	30,58	0,00
CUC60	44,833±6,6129	52,700±4,7135	43,44	0,00
F6	1063,000± 123,1251	1293,500±121,5857	65,60	0,00

Legend: VAR-variables, INITIAL /FINAL MEAN±SD-arithmetic mean at initial and final testing±standard deviation, F-Test results, p – error

Table 2. represent influence of each test on differentiating experimental group after three years of training period. All tests achieved a significant positive shift after between this two time lines.

Table 3. Difference between experimental and control group at initial testing

	Mean E	Mean C	t	df	p
ATV	153,277	150,368	1,38128	56	0,172678
ATT	44,603	41,479	1,21940	56	0,227803
AOP	21,517	20,904	1,10236	56	0,275022
ANN	12,087	12,833	-0,39693	56	0,692926
MPN	13,846	16,392	-2,63679	56	0,010811
MPR	55,333	48,738	2,93468	56	0,004834
MSD	173,133	160,500	2,40863	56	0,019328
MTR	26,867	24,976	2,67890	56	0,009679
MIV	32,271	25,354	1,42669	56	0,159222
MPT60	40,200	28,750	5,80987	56	0,000000
F6	1063,000	1009,893	1,47742	56	0,145164

Legend: Mean E – arithmetic mean of experimental group; Mean C – arithmetic mean of control group; t – t value; df – degrees of freedom; p – error.

Table 4. Difference between experimental and control group at final testing

	Mean CS	Mean A	t-value	df	p
ATV	168,707	159,089	4,18209	56	0,000103
ATT	58,047	47,789	3,26740	56	0,001857
AOP	24,382	21,782	4,13648	56	0,000119
ANN	10,233	13,571	-2,04799	56	0,045261
MPN	10,769	14,773	-5,12630	56	0,000004
MPR	61,342	46,583	7,32800	56	0,000000
MSD	203,000	178,548	4,11678	56	0,000128
MTR	31,767	28,048	4,29272	56	0,000071
MIV	50,793	34,447	2,77532	56	0,007483
MPT60	48,567	34,929	7,60066	56	0,000000
F6	1293,500	1067,000	6,66634	56	0,000000

Legend: Mean E – arithmetic mean of experimental group; Mean C – arithmetic mean of control group; t – t value; df – degrees of freedom; p – error.

Discussion and conclusions

Variance analyses between the initial and final status in the experimental group judokas and wrestlers point to a statistically significant positive shift in all tested characteristics and abilities of anthropological status. It can be concluded with certainty that wrestling and judo training of 11 and 14-year-old boys, three times a week, 75-90 minutes, brings greater positive changes than doing sports activities only in PE classes in primary schools. The evidence that doing sports activities only twice a week is not enough to bring significant changes in anthropological status shows the research where it is demonstrated that changes are greater as the training period of judo wrestlers and wrestlers is longer. (Vračan, Sertić, Baić 2004; Cvetković, Sertić, Marić, Pekas, Baić 2004; Baić, Sertić, Segedi 2005). Testing the difference between the experimental and control group (table 3 and 4) show that at the end of the three-year training period, the significant difference is present in all tested variables which confirms above mentioned conclusion. Differences in anthropometrical characteristics between the experimental and control group, regardless genetic conditionality of changes, indicates that judo wrestling and wrestling training direct more regularly the body growth and development by the reduction of subcutaneously fatty tissue (variable upper arm skinfold ANN at the beginning of the measurement does not indicate differences between the experimental and control group, and at the end of the three-year training process these differences are statistically significantly better in favour of the experimental group) and by the increase of muscular mass for which is forearm circumference a good indicator in case of upper arm skinfold reduction. There are differences between the two subject groups already at the initial testing of some motor abilities (coordination, flexibility, power muscular endurance of legs, and speed of hand movements). The differences are even bigger at the end of the three-year training period. The most interesting to follow is the dynamic of motor abilities development during the three-year training of wrestling sports. Development dynamic of certain abilities and characteristics of children in wrestling sports can be followed analysing the already published project data.

Only after one year of training period, boys in wrestling sports reach the significant growth of abilities, but one part of the motor space has not been yet included in these changes. There are no statistically significant changes in variants to evaluate flexibility, specific endurance, relatively dynamic muscular endurance of legs and upper arm skinfold. (Sertić, Segedi, Baić 2005).

Properly aimed training at the age of 11 does not imply great emphasis on specific endurance and strength, therefore there are less changes of these abilities.

After two years of the training process statistical significant changes are seen in all variables except in the area of the specific endurance estimated by a variable plus two push-ups in 90 seconds (BAC+2SKL). (Vračan, 2007)

Three-year effects of training (table 4) finally include this part of motor space so it can be concluded with great certainty that wrestling sports training positively influences on the development of all tested motor and functional abilities, and to a great extent positively directs the body growth and development.

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