

THE INFLUENCE OF A YEAR-LONG JUDO TRAINING PROGRAM ON THE DEVELOPMENT OF THE MOTOR SKILLS OF CHILDREN

(Research note)

Dragan Toskić¹, Ljubiša Lilić¹ and Lazar Toskić²

¹*University of Priština, Faculty of Sport and Physical Education, Leposavić, Kosovo i Metohia*

²*University of Belgrade, master student at the Faculty of Sport and Physical Education, Serbia*

Abstract

The aim of this research was to determine the influence of a year-long judo training program on the transformation of the motor dimensions of participants defined as population of younger school children, aged 8. A total of 12 motor tests were applied on a sample of 60 participants, which were selected so that the analysis of the structure could be carried out on second-level factors (Gredelja, Metikoša, Hošek, & Momirović, 1975), defined as movement structuring, regulation of tonus and synergy regulation, regulation of the intensity of excitation and the regulation of the excitation duration. Through transformation and condensation of variables in the motor space, one discriminant variable was isolated which separates the groups on the basis of discriminant coefficients. The agreement of the results obtained for the groups of participants is very high and has a value of .80, which speaks in favor of the connection between the discriminant functions. By gaining insight into the coefficients which determine the discriminant function, we can determine that it separates participants on the basis of segmental hand speed, explosive leg strength, explosive hand strength and explosive strength of the shoulder belt, body coordination, flexibility of the torso, repetitive strength of the torso and the lower extremities and the force of the torso. On the basis of the size and sign of the centroid projections onto the discriminant function, we can conclude that the trend of the results is such that the tested motor skills increased after the experimental period. This claim confirms the fact that judo training and judo combat are dominated by strength exercises, coordination, flexibility and force.

Keywords: *pupils, judo techniques, training process, segmental hand speed, explosive leg strength, explosive hand strength, explosive strength of the shoulder belt, body coordination, flexibility of the torso, repetitive strength of the torso, lower extremities explosive strength, torso strength, discriminant analysis*

INTRODUCTION

Systematic judo training, as well as numerous other activities, as a rule causes entire sequence of changes in the anthropological status of a person who has taken part in this kind of treatment.

Changes in the state of the athlete are most often manifested in the area of certain skills and features, and especially in the sphere of motor knowledge. As is well known, all anthropological characteristics, including motor skills, can change both in a qualitative and quantitative sense. At the same time, quantitative changes include those changes which are more pronounced either in terms of the increase or decrease of the effectiveness of some skill, feature or motor information, while qualitative changes include changes between the aforementioned characteristics. Even though both types of changes occur at the same time, it was possible, by a suitable

choice and distribution of kinesiological content, modality and volume, to have more significant influence on a certain type of change. At the same time, it is important to emphasize that the full effects of the caused quantitative changes can be expected only under the conditions of establishing optimal relations between the suitable skills, features and knowledge.

Seeing how the motor activity of a subject directly depends on the level and mutual relations between the anthropological characteristics, being familiar with the laws under which the processes of quantitative changes in the human body take place, is of key importance for effective programming and control of kinesiological transformational processes.

This research aims to offer a modest contribution toward gaining knowledge regarding the changes which occur among younger school age individuals under the

influence of a year-old training program. During a year-long training process, all groups of judo techniques were used. Tachi-waza includes hand, leg, lateral and Sutemi-waza techniques, and in the Katame-waza techniques, Osae-komi-waza, Kansetsu-waza and Shime-waza.

METHODS

The population from which the sample of participants was extracted can be defined as population of school children aged 8. On the basis of the selected statistical-mathematical model and the aims of the research it was decided that the sample should consist of 60 participants.

The sample of variables consisted of 12 variables of motor skills. To evaluate motor skills from the structural model of motor skills (Gredelj, Hošek, Metikoš, Momirović, 1975) the following manifest variables were used: evaluation of *structuring of the movement* - 1. Hand tapping (TAP), 2. The polygon backwards (PLN), 2. The three-ball slalom (S3M), evaluation of *the tonus regulation and synergy regulation* - 4. Hyperextensions (DPK), 5. Standing on one leg (SJM), 6. Side movements of the torso (ISK), evaluation of *the intensity of excitation regulation* - 7. The standing depth jump (SDM), 8.

Running to the side (TVS), 9. Throwing a medicine ball from a prone position (BML), to evaluate *the duration of excitation regulation* - 10. Hanging leg raises (INS), 11. Leg lifts from a prone position (DNL) and 12. Torso lifts (DTT).

In order to determine the differences in the motor skills, a canonical discriminant analysis was used.

Table 2. The matrix of the structure of motor variables

Variables	FUNC1
TAP	.71
SDM	.51
BML	.44
PLN	-.40
DPK	.38
DTT	.31
S3M	-.27
DNL	.26
INS	.23
TVS	-.19
SJM	.11
ISK	.09

RESULTS

On the basis of the appointed goals, we wanted to determine the differences between the initial and final measuring of the participants which were under the influence of the judo training process. Through the transformation and condensation of variables in motor space, a discriminant variable was isolated which maximally separates the participants based on discriminant coefficients.

The agreement between the results is very high and has a value of .80, which speaks in favor of the connection between the discriminant functions.

The discriminant function explains the differences with 100.00 % of the variability of the applied discriminant variables.

By gaining insight into the coefficients which determine the discriminant function (Table 2.) we can note that it distinguishes between participants on the basis of simple movements, explosive leg strength, explosive arm strength, coordination, flexibility, repetitive strength of the torso and force.

On the basis of the size and sign of the centroid projections onto the discriminant function (Table 3.) we can conclude that the trend of growth of the results is such

Table 1. The canonical discriminant function

Fcnn	λ	Pct of V	Cum Pct	Can. Cor	Wilks λ	χ^2	DF	Sig
1	1.88	100.00	100.00	.80	.34	108.22	12	.00

that all of the tested motor variables increased after a year-long training process. The judo training program contained, among other things, arm, leg, techniques Koshi-waza and Sutemi-waza throwing techniques, as well as Katame-waza holding techniques, Kansetsu-waza and Shime-waza.

The results obtained in this research have indicated that the hand techniques contributed toward the development of all three types of strength, flexibility as well as balance control. This is quite expected if we know that the Ippon seoi nage technique, which is a typical representative of the hand techniques, is performed with semi-flexion of the joints of the lower extremities, bringing the body's center of gravity to the borderline values of the surface of the body support which increases the safety of the balance position. Forcing one's opponent to leave the position of balance and the simultaneous rotations around a vertical axis are performed with the

Table 3. Group centroids

Measurings	FUNC1
1	-1.36
2	1.36

inclusion of the extensor muscles of the lower extremities, which at that point is functioning with a concentric contraction by central point of support. During the final phase of the throw, it is necessary to bring the muscles into the regime of isometric contractions, to perform the reactive transference of the swing to the remaining lever systems, to maintain one's balance and stop the movement.

Lateral techniques influence on the development of explosive leg and arm strength, the static strength of the abdominal muscles, as well as the ability to maintain the balance and flexibility of the body. In order to perform the Tsurikomi Goshi technique which belongs to the lateral techniques, it is necessary to be in possession of good explosive leg strength, good explosive arm strength, repetitive strength of the lower extremities, higher alternative movement speed, good coordination and greater flexibility of the lower thigh.

Leg to a great extent depends on the development of the explosive, repetitive and static strength, as well as on the flexibility, balance and the frequency of simple movements. Seen from a biomechanical point of view, this connection is justified since during the first phase of the O Soto Gari throwing technique which is a typical representative of the leg techniques, explosive strength dominates, as the harmonious movement of the arms and legs does. In the final throw phase, the muscles must function through isometric contractions, so as toward stopping the movement and maintain maximal control which could be obstructed due to the great swing and speed of movement of both bodies.

Control techniques, where it is necessary to maintain a maximal control over one's opponent and maintain control over one's center of gravity, significantly contributes toward the development of all forms of strength, especially the static strength.

CONCLUSION

The results of this research have shown that through proper organization of the work and the adequate dosing of the extent and load during a year-long judo training cycle, it is possible to affect the development of almost all the motor skills of children.

This study has once again shown that being familiar with the laws which regulate the processes of quantitative changes in the human body is of vital importance for effective programming and control of the kinesiological transformation procedures.

By gaining insight into the obtained results, we have the right to claim that the judo training program which contained, among other things, the arm, leg, lateral and the Sutemi-waza techniques, as well as the Osae-komi-waza, Shime-waza and Kansetsu-waza techniques, contributed to the increase in the results so that all the tested variables of motor skills increased after a year-long training process.

All these elements confirms our current knowledge of the significance of being familiar with the means of the influence of physical exercise on certain dimensions

of the personality without which it would be absolutely impossible to know to which extent we have achieved our goals during the work.

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Dragan Toskić
University in Pristina with temporal base in Leposavić
Faculty of Sports and Physical Education
Str. Dositej Obradović bb, 38218, Leposavić
Kosovo-Metohija, Serbia
E-mail: dragantoskić@gmail.com