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ADDITIONAL EXERCISES FOR DEVELOPMENT OF MOTOR SKILLS OF YOUNG KARATE PLAYERS

Summary

*The studywas done on a sample of 80 selected cadet karate playersaged 14 and 15,chosenfrom the following karate clubs: KK "Omladinac" Sokolac ,KK „Glasinac" Sokolac, KK „Ilidža", Istočna Ilidža, KK „Pale" ,Pale, KK „Rogatica" , Rogatica, and KK „Sarajevo" ,Sarajevo. The subject of this study is assessment of quantative and qualitative changes in motor skills during a three-month experimental treatment applied in the main part of karate training of young karate players. The main aim of this study is to determine the impact of additional exercises on the development of basic motor skills in segmental and sprint velocity of participants in the experimental group. The sample was divided into two homogenous subsamples on the following way: the first subsample counted 40 and made the experimental group. In that group were karate players who, in the proccess of regular training realisation, in the first part of the training,did the exercises from planned contests in 60 % time, while the other 40 % was reserved for the realisation of the model additional exercises for motor skills development of karate players. The second subsample with 40 participants made the control group. There were karate players who,in the proccess of regular training realisation, in the first part of the training,did the exercises from planned contests in 100 % time. For assessment of basic motor skills we applieda set of tests assessingthe areas of hypothetical factors which are supposed to be responsible for realisation of specific movementstructures in karate. Variables which are used in this work are:**Segmental velocity**(foot tapping,hand tapping,Tapping foot against the wall); **Sprint velocity(**Running 20 m high start;Running 40 m high start;Running 60 m high start).*
The results gained in this study show the positive impact of the experimental treatment,based on statistically significant difference between initial and final measurements made in the experimental group.The significant impact of the applied model of exercises is probably the result of the appropriate methodological model of experimental program of additional exercises and adequate intensity timing and volume of burdening which was tailored to abilities and characteristics of the practicioners. According to the carried out statistical analyses, it can be concluded that programmed training, with main and additional exercises, had inflenced on quantative and qualitative changes in motor skills of children karate players, in terms of basic motor abilities.
Key words: *experimental treatment,motor skills,karate*

INTRODUCTION

Karate is arguably one of the most popular martial arts practiced worldwide and it is consisted of twocompetition disciplines- kata and combat.In the earlier periods of karate development it had similar requests according to the training and asssesment of the competitive practice in both disciplines and traditional training contained the techniques of practice,kata and sparing (Imamura et al. 1998). Changes in judmental rules,especially in sport combats, have led to significant differences in trainings and competitive requests in kata and combats(Jovanović i Mudrić, 1995), thus in modern karate we rarely can find cases of a competitor taking part in in both disciplines.

Researches have shown that systematical longlasting karate trainings can affect the improvement of basic motor skills, which are mostly exercises aimed for development of burst strenght,speed andcoordination (Simonović, 2010Kuleša, 1985., Arlov, 1997., Kovača., 2003 i 2008., Blažević, Katić i Popović, 2006). Exercises which are applied in practising techniques of karate activate the whole musculature and develop left and right part of the body equally,avoiding developing of just one part,which happens in some sports.The main features of karate are fast,explosive movements with controlled strenght of realisation to opponent.

Training work with school children ,as in all other sports,is distinguished from older-aged practitioners in applied methods and means.In this age more attention is given totechnical preparation,thus the work is objected to aquisition of basic karate techniques.The purpose of this study was to determine the influence of additional exercises on the development of basic motor skills,segmental and sprint velocity of practicioners in the experimental group.Special aim of the study in control group practicioners is to determine the influence of the exercises on the development of motor skillsin segmental and sprint velocity,tailored by plan and programme.The research was aimed on valorisation of additional exercising model on the development of anthropological features of young karate players.

It is expected that gained results will contribute to better quality realisation of training processes of young karateists by making inovations in plan and programmes of a training process.

The methods

Sample of participants

The sample was made up by 80 boys, mean age 14-15,and thendivided into two equally homogenous subsamples in the following way:

The first subsample consisted of 40 participants who made experimental group.It was made by karateists who attended regular katate trainings and who did in the first part of training exercises from plan and program contests in 60% time,while the other 40% was reservedfor realisation of the additional exercise models aimed to develop the motor skills of karate players.

The second subsample consisted of 40 participants who made control group.It was made by karate players who,in a process of karate training realisation,in the main part did the exercises set by plan and programme in 100% time.

Average height and mass of the experimental group:

Variable	Arithmetic mean	Standard deviation
Body height	157,32	6,15
Body mass	47,15	7,30

Average height and mass of the control group:

Variable	Arithmetic mean	Standard deviation

Body height	155,44	5,23
Body mass	44,63	6,90

For all participants involved in the research there were earlier defined conditions to be fulfilled:

- To be healthy;
- To be involved into regular trainings during experimental period (experimental group);
- To be involved into all measurements of motor skills.

Before the experimental programme was started and after its three-month completion, both groups of participants were tested motor skills with 6 measuring instruments (tests) for estimating segmental and sprint velocity. Tests were selected on base of instructions and recommendations of Kurelic and associates,1975.
The experimental programme of additional exercises lasted three months with three training (60 minutes individually) per week on regular karate training. During the experimental period two measurements of motor skills were carried out (at the beginning of the experiment, the initial measurement and at the end of the experiment final measurement)for all participants of the experimental and control group.

Table 1. Programmeof additional exercises for the experimental group.

Training program in experimental period	**Number of lessons**
Initial diagnosis of motor skills	**Before the realisation of the program**
Sprint exercises	**6**
Coordination exercises	**7**
Explosive power exercises	**6**
Flexibility exercises	**5**
Agility exercises	**7**
Shape exercises	**6**
Streching exercises	**During every lesson**
Final diagnosis of motor skills	**After the realisation**
The whole number of lessons	36

Sample of variables and measure instruments

For the assessment of basic motor skills a set of tests measuring segmental and sprint velocity.
Tests for assessment of segmental velocity:

- Hand tapping MTAPR
- Foot tapping MTAPN
- Tapping foot against the wall MTAPZ

Tests for assessment of sprint velocity

- Running 20 m highstart M20VS
- Running 40 m high startM40VS
- Running 60 m high startM60VS

Applied set of motor variables was taken from the research Kurelic, Momirovic, Stojanovic, Sturm i Viskic-Stalec, 1975.

The participants in the control group did the main part of the karate training which was made earlier for that age group of karatists.
Work in the experimental group,within the model of additional exercises for development of segmental and sprint velocity,was based on applying the following exercises:

Sprint exercises

- *Increase in sprint frequency:* fast skipping,exercises with a rope,sprints with fast heel striking, short pace running
- *Development of maximum acceleration with variable content:* Different pace running(the same frequency)running with changing the position of the knees,running under,above and around the high-jump uprights
- *Progressive increaseof speed:*running in alterative acceleration until the maximum speed
- *Maximum speed running*: Running 20-40m high or flying start.

Coordination exercises

- *Acrobatics:*forward roll+ standing-up,flying forward roll+ standing –up,backward roll + standing-up.
- *Skipping the rope:*in place,in pair, in a group
- *Walking and running*:inversion and eversion of lower leg,walking on the line,on tiptoes,on heels,on the inner and outer sides of feet.

Explosive power exercises

- *Half squat jumps:*from half squat posizion jump laterally,zig-zag or backwards
- *Jump on the hurdles:*one-foot or two-feet jump on the hurdles (30 - 40 -50 cm).
- *Explosive power jumps:* long-distance jump,triple jump,fifth jump,high-jump from place or in short flying.

Flexibility exercises

- *Rotation of torso leanig forward:* streching of hips,belly and thight;while bending forwardmove right hand to the left foot,left arm hold up for 4 to 6 seconds. Then return to start position
- *Leaning forward while sitting with feet on the ground*: extension of the shoulder muscles, upper thigh and calves.

Agility exercises

- *Running from different positions*: from lying on the stomack-forward:: from lying on the back-forward; : from lying on the stomack-forward-rotation for 90°; from lying on the back-forward-rotation for 90°;from lying on the side-forward-rotation for 270°;forward-rotation for 90°;
- *Running with direction change.*: running in winding directions, zig-zag running saround marks,forward-backward with stops,running in triangle,running around eight-shaped uphold
- *From slow running forward change direction to linear movement in high skiping*: focus is on fast change of way of moving,focus on jump with a leg(from direction of frontal movement*)*

Shape exercises

- *Exercises for shaping shoulder miuscles:*front and side cicles with both arms higher amplitude, turning hands around and moving backward,stretching the rubber rope in pose of moving backward.

- *Exercises for torso shaping* : moving hands backward with higher amplitude in standing,kneeling and lying position, hyperextensionsin standing and sitting position, moving torso to the left and to the right.
- *Exercises for pelvic and legs*:Hypertensions of torso,moving torso in circles,moving legs forward and backwardswith high amplitude,circular body movements in feet and hips joints circles,squats ful leg flexion.

Streching

- Stretching of shortened muscles, especially large chest muscles,bicepces,muscles for moving hand and fingers,pulling both feet with hands; deep body movement forward with bended legs“cats sat“;sitting with bended legs,pushing hands forward, pulling knees to the chest.

For determination of the intergroup differences between initial and final measurement,Multivariance(MANOVA) and Univariance analysis of variance(ANOVA)were counted,and significance of differences between initial and final measurement were counted in cannonical discriminative analysis.

RESULTS

Variance analysis

Multivariante analysis of variance in motor skills between experimental and control group of participants on initial measurement.

Table 2. Multivariate analysis of variance in motor skills between experimental and control group of participants on initial measurement

WILK'S LAMBDA TEST	.725
RAO-va F-aproximity	1.46
Q	.252

legend: validity of Bertlet's tests (Wilks' Lambda), Raova F-aproximity (Rao's F) and level of importance (Q)

Analysing table 2.in which are shown the results of testing the significance of importance on the level of arithmetic means in all motor tests between intial measurement of samples in experimental and control group. It is not determined statistically important difference,because WILK'S LAMBDA is .725, what Rao's F- aproximation from 1.46 gives significance in differencies on the level ofQ= 252. According to that, in applied system of motor skills of participants stastistically signnificant differences
are not distinguished.

Table 3. Univariant analysis of variance in motor skills between experimental and control group on initial measurement.

Variables	Mean (E)	Mean (K)	F-relation	P-Level
MTAPR	37.57	36.57.	1.34	.126
MTAPN	25.64	26.33	1.37	.135
MTAPZ	14.87	15.43	1.44	.165
M20VS	4.20	4.48	1.55	.149
M40VS	6.55	6.45	1.48	.165
M60VS	8.46	8.64	1.43	.152

*Legend:*Aritmetahical mean experimental group (Mean (e)), ritmetahical mean control group(Mean (k)), value F-test (F-relation) and level of significance (Q)

Table 3shows univariant analysis of variance motor abilities compared with results of arithmetical mean of experimental and control group on initial level. On the basis of coefficients F-relations and their significance (P-Level) it could be said that statistically significant difference in levels of motor skills between experimental and control group is not distinguished.

Multivariante analysis of variance in motor skills between experimental and control group of participants on final measurement

Table 4 . Multivariate analysis of variance of motor abilities between the experimental and control group at the final measurement

Wilks' Lambda	Rao's R	Q
.182	10.88	**.001**

Legend: valuesof Bertletes test (Wilks' Lambda), Raova F-aproximaty(Rao's R) and level of significance (Q)

Table 4 shows the results of the multivariate analysis of the variance between the participants of experimental and control groups on the final measurement indicate that there is statistically significant intergroup difference in WILK'S motor skills since LAMBDA is .182, which by Rao's F-approximation of 10.88 gives the significant differenceat the level of Q = .001. Accordingly, statistically significant differences were found in the applied motor skills ofparticipants.

Table5. Univariate analysis of variance of motor skills between the experimental and control group ot the final measurement

Variables	Means (E)	Means (K)	F-relation	Q
MTAPR	39.87	41.30	5.65	**.000**
MTAPN	27.32	28.24	4.50	**.000**
MTAPZ	15.54	17.05	4.94	**.003**
M20VS	3.54	4.35	4.47	**.000**
M40VS	5.84	6.34	5.52	**.002**
M60VS	7.95	8.58	6.43	**.004**

Legend: arithmetic mean of experimental group (Mean (e)), arithmetic mean of controll group(Mean (k)), value F-test(F-relation) and level of significance (Q)

Table 5 shows a univariate analysis of variance of motor skills tests by comparing the results of the arithmetic mean of the experimental and control group at the final measurement. Based on the coefficients of F-ratio and their significance (P-Level), it can be concluded that a statistically significant difference in the level of motor abilities between the experimental and control group in all motor tests: in hand tapping (MTAPR .000), foot tapping (MTAPN .000), tapping foot against the wall (MTAPZ .003), running 20 metres (M20VS .000), running 40 metres(M40VS .002) and running 60 metres(M60VS .004).

Cannonical discriminative analysis

Differences between initial and final measurements of motor skills in control group

Table 6. Significance of isolated discriminative functionof experimetal group.

Disc Func.	Eigenvalue	Cannonical R	Wilks' Lambda	Chi-Sqr.	df	P-Level
1	3.272	.74	.237	93.77	6	**.000**

Legend: coefficient of determination1Jenta (Eugen value), coefficient of cannonical correlation (Cannonical R), values of Bertletes test (Wilks' Lambda), size of Hi square test(Chi-Sqr), degrees of freedom(df) and level of importance of coefficient of determination (P-Level)

We got significant dislaimiant function of high intensity(CR=74%) which shows corelation set of data which was base for discriminative analysus gained results (table 13)Results of discriminitive strenght f motor variables are shown in test Wilks-Lambda (.237), what indicates that differences between initial and final measurement in space of experimental group motor skills are significant (p=.000). because size of Hi square test has high value (Chi-Sqr = 93.77).

Table 7. Factor structure of isolated discriminative function in experimental group.

Variables	Root 1
MTAPZ	0.601
MTAPN	0.586
M60VS	0.544
MTAPR	0.514
M40VS	-0.500
M20VS	0.400

Table 13 gives the structure of discriminant functions of involving motor abilities variables in forming significant discriminant functions. Shown centroids of gruops represent arithmetic mean of results from initial and final measurement of additional exercises models,measured with six motor tests. These test are supposed to be good predictors of space research. Shown results indicate that greatest contribution in discriminant function has tapping foot against the walls (MTAPZ 0.601), foot tapping (MTAPN 0.586) and running 60 meters(M60VS 0.544). The obtained results of the discriminatory analysis of motor skills in the final versus the initial measurement in the experimental group indicate that under the influence of the model of additional exercises, there were significant changes in the motor skills of the participants.

Differences between initial and final measurements of motor skills in control group

Table 8. Significance of the isolated discriminatory function of the motor abilities of the control group

Disc Fune.	Eigenvalue	Cannonical R	Wilks' Lambda	Chi-Sqr.	df	P-Level
1	0.624	.27	.786	17.28	6	.196

Legend: Coefficient of discrimination (Eugenvalue), coefficients of canonical coleration (Cannonical R), values of Bertletos test(Wilks' Lambda), size in Hi squaret test (Chi-Sqr), degrees of freedom (df) and level of significance of coefficient of determination (P-Level)

A discriminating medium-intensity function CR = 27% was obtained which shows the correlation of the data set on the basis of which a discriminatory analysis of the results obtained was performed (Table 16). The results of the discriminative strength of the variables were given by the Wilks' Lambda test (.786), which confirms that the differences between the initial and final measurements in the area of motor control capabilities of the control group are not significant (P-Level = .196), since the size of the square of the test has a low value Chi-Sqr = 17.28).

Table 9. Factor structure of the isolated discriminative function of the control group

Variables	Root 1
MTAPR	0.398
MTAPN	0.286
MTAPZ	0.275
M20VS	0.183
M40VS	0.146
M60VS	0.100

Table 9 shows the structure of the discriminatory function of the participation of variables of motor skills in the formation of significant discriminatory functions. The indicated centroid groups represent the arithmetic means of the initial and final measurement results. In order to determine the significance of differences between the initial and final measurements, the control group measured six motor tests, which are assumed to be good predictors of the investigated space. The results shown are all the coefficients of the value set, and on the basis of the total contribution of all motor tests it can be concluded that there were not statistically significant transformation processes in the motor space of the control group of the participants.

DISCUSSION

Technique learning or technical preparation begins with teaching and continues with training aimed to acquisition of movement habits. To do a karate technique properly and efficitevly it is needed to have a certain level of motor skills. Development of motor abilities and technical preparation are connected and dependable,which means that the development of karate techniques is afeccted by development of motor skills and vice versa.It is widely known (Malacko, 2008) that giving action to one part of antrophological characteristics has effects on the whole range of other organic systems and segments, which is especially remarkable in situations when good results are required.

Anthripological characteristics of school children (acc. Malacko, 2002; Pržulj, 2007) could be developed in "sensible phases" , which are made in periods when on the basis of natural laws the most significant speed of development of particular skills and characteristics happens,increase adaptional possibilities compared to egsogene factors and favourable assumptions gaining certain motor abilities are formed. In period aged between 10-15 child organism is liable to outer influences although they are similar to elementary tendencies of natural flow of changes.

Changes of anthropological dimensions of school children are featured with longer trainings,material needs and teacher's or trainer's knowledge whose field of work should be based on knowing the global manifestations and rules which are fundametal for successful planning of appropriate transformation treatment.

Because of all these things application of adequate scientific processes for assignement of the dimensional structures,their relations and development rules and diagnostics procedures which enable control of work effects are extremely important.Beside that,it is essential to determine reliable measure instruments for tracking states and dimensional changes which are intended to be developed with the application of physical exercises.

The results gained in this study show the positive impacts of experimental treatment,based on statistically significant difference between initial and final measurement in the experimental group.Significant impact of applied programme model of exercises probably occured because of appropriate methodological plan of experimental programme of additional exercises,adequate intensity timing andvolume of burdening which was tailored to abilities and characteristics of the practicioners.

CONCLUSION

Based on the conducted statistical analyses, it can be concluded that the programmed training, with main and additional exercises, influenced qualitative and quantitative changes in the motor skills children-karate players in the area of basic and specific motor skills.

Furthermore, it was noticed that programmed karate training with its contents significantly improved the motor status of the entity relative to the initial state. Both the initial and final states of both groups in the tested motor variables are statistically significant.

This study has shown that the motor skills of boy karate players aged 14 to 15 under the influence of karate training are developed linearly, and if they want to achieve the same effects at the age of 14 to 15, transformation processes must be strengthened by applying higher values of extensiveness and intensity of load

In order to determine the influence of additional exercises for the development of motor skills of the selected young karate players we analyzed the results obtained on a sample of 80 participants - young karate players. A canonical correlation analysis was used to determine the influence of additional exercises for the development of motor skills.

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