THE INFLUENCE OF THE TRAINING MODEL ON THE DEVELOPMENT OF THE ANTHROPOLOGICAL CHARACTERISTICS OF KARATISTS

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Abstract: *The main objective is to determine the effects of the karatists's training model on the development of anthropological characteristics of the experimental group. The subject of the research are morphological characteristics, motor and functional abilities of karate students of the experimental group. The subject of research is also the model of adaptive physical training exercises. The problem of the research is the examination of the statistically significant impact of the training model on the improvements of certain anthropological characteristics of the experimental group. The sample was consisted of 104 students training karate that are studying at the State University of Novi Pazar, between the ages of 19 and 22 years. The entire sample of the respondents was divided into two subsamples: The first subsample consists of 40 respondents defined as the experimental group. This group was covered by the training model on the development of anthropological characteristics, three times a week for 60 minutes in total duration of twelve weeks. The second subsample of 64 respondents is the control group. This group was covered by the training model in their karate clubs, three times a week for 60 minutes in total duration of twelve weeks. The work related to the realization of the experiment was set so that each group of subjects can implement 36 training hours. Seven anthropometric measures, twelve motor and three functional tests were applied at the initial and final measurement in both of the group of respondents. The analysis of covariance showed that the experimental groups at the final measurement is statistically significantly different with higher level of morphological characteristics, motor and functional abilities from the respondents of the control group.*
Key words: *experimental and control group of the karatists, training model, anthropological characteristics, analysis of variance, discriminant analysis and analysis of covariance*

SUBJECT OF THE RESEARCH

The subject of the research are morphological characteristics, motor and functional abilities of karate students of the experimental group. The subject of research is also the model of adaptive physical training exercises.

Morphological characteristics, motor and functional abilities are closely related and it may be presumed that they also have a significant impact on the efficiency of the realization of the training model in the experimental group of karatists.

The largest transformations in the morphological characteristics may occur in the subcutaneous adipose tissue, in the volume and the mass of the body, and very small or neglecting transformations may occur in the longitudinal and transversal dimensionality of the skeleton.

Functional abilities are responsible for the ability to adapt on the increase of the labor requirements and maintaining stability in the regulation and coordination of organic systems functions.

The total duration, the intensity of the process of exercise and adequate application of relaxation intervals particularly affects the results in the change of characteristics, abilities and motor skills. It can be presumed that karate students with which the training model was applied will show more quality of body adaptive processes, primarily in the increase of applied anthropological dimensions.

PROBLEM OF THE RESEARCH

The problem of the research is the examination of the statistically significant impact of the training model on the improvements of certain anthropological characteristics of the experimental group.

It can be presumed that significant adaptive processes of anthropological characteristics, under the influence of the training model, can be also achieved in karatists that are in the older age categories,

and with that the results obtained in this study would contribute to a more efficient implementation of the training process.

AIM OF THE RESEARCH

The main objective is to determine the effects of the karatists's training model on the development of anthropological characteristics of the experimental group. With the realization of the aim that was set like this, a possibility of forming rational procedures for optimal planning, programming and control of the training process would be achieved. With that, the harmonization of their development would be examined and if possible, more valid and meaningful guidelines for the further desired anthropological development of karatists would be determined.

METHODS OF THE RESEARCH

The sample of respondents

The sample was consisted of 104 students training karate that are studying at the State University of Novi Pazar, between the ages of 19 and 22 years. The entire sample of the respondents was divided into two subsamples: The first subsample consists of 40 respondents defined as the experimental group. This group was covered by the training model on the development of anthropological characteristics, three times a week for 60 minutes in total duration of twelve weeks. The second subsample of 64 respondents is the control group. This group was covered by the training model in their karate clubs, three times a week for 60 minutes in total duration of twelve weeks. The work related to the realization of the experiment was set so that each group of subjects can implement 36 training hours.

The sample of measuring instruments

The sample of measuring instruments for the assessment of morphological characteristics

Circular dimensionality and body mass:

1. Medium circumference of the thorax shown in centimeters	AOGRK
2. Circumference of the upper arm shown in centimeters	AONDL
3. Circumference of the lower leg shown in centimeters	AOPTK
4. Body mass shown in kilograms	ATEŽT
Subcutaneous adipose tissue	
5. Abdominal skinfold shown in millimeters	ANTRB
6. Upper arm skinfold shown in millimeters	ANNDL
7. Lower leg skinfold shown in millimeters	ANPTK

The proposed model of the sample of anthropological measures was made on the basis of the recommendations from the International Biology Program (Lohman, Roche and Martorell, 1988).

The sample of measuring instruments for the assessment of motor abilities

Flexibility

1. The deep forward bend on the bench	MDPK
2. The split	MŠPA
3. The turn with the bat	MISP

Segmentary speed:

4. Taping with the foot	MTAN
5. Taping with the hand	MTAP
6. Taping feet against the wall	MTAZ

Sprinter speed:

7. Running on 20V	M20V
8. Running on 30V	M30V
9. Running on 50V	M50V

Explosive strength:

10. Vertical jump (" Sergeant")	MSRĐ
11. Standing long jump	MSDM
12. Standing triple jump	MTRS

The sample of measuring instruments for the assessment of functional abilities

Pulse frequency after the workload	FPPO
Anaerobic capacity with the Margaria Test	FMRG
Vital capacity of the lungs	FVKP

Functional tests in this research were taken from the model of functional tests (Heimar and Medved, 1997).

Methods of processing data

1. Central and dispersive parameter functions of the distribution of anthropometric measures, motor and functional tests were calculated. For each measure and variable of the respondents arithmetic mean (X). standard deviation (SD) was calculated, which is a measure of the distance of the respondents results from the arithmetic mean. For accessing the size of the range (variability) minimal (MIN) and maximal (MAX) result will be calculated.
2. Normality of the distribution in this research was determined by two methods: Skewness (SKEW.), Kurtosis (KURT.)
3. Multivariate analysis of variance For determining the inter-group differences of the experimental and the control group the multivariate analysis of variance was applied at the initial measurement (MANOVA), and the differences between the groups for each variable individually were determined by the analyzes of variance (ANOVA).
4. Canonical discriminant analysis - This analysis was used for determining differences and hierarchy of the anthropometric measures of morphological characteristics, variables of dimensions of the motor and functional abilities of the experimental and the control group which were created under the effect of the application of the model of additional exercises on the development of anthropological dimensions. On the basis of the transformation of the latent and manifest variables in the system of canonical variables, the following parameters are contained in the tables: The coefficient of canonical discrimination (Eigenvalue); The coefficient of canonical correlation (R Canonical); The significance of the discriminant strength of the coefficient of the canonical discriminant (tested by the value of the Bartlett X^2 test) will be shown with the Wilks' Lambda test; The size of the Chi-squared test (Chi-Sq); The degrees of freedom (Df) and the significance of the discriminant (P - Level).
5. Multivariate analysis of covariance - Multivariate analysis of covariance was used in order to determine the effects of the model of supplementary exercises on the development of anthropological dimensions of the experimental group. The analysis of intergroup differences of the three studied areas was calculated (morphological characteristics, motor and functional abilities) with applying the multivariate analysis of covariance (MANKOVA), while the individual intergroup differences of the tests and measures were determined by the univariate analysis of covariance (ANCOVA). In applying this analysis, possible existing differences in the initial measurement between the experimental and the control group were neutralized, while the process of determining the differences between the experimental and the control group was conducted using partialized corrected medium values of the morphological characteristics, motor and functional abilities at the final measurement.

Experimental exercise program

Experiment lasted for three months, with three classes of exercise per week, for a total of 36 hours of training process.

Table 1: Program of the structure of the training model

PROGRAM OF WORK IN THE EXPERIMENTAL PERIOD		NUMBER OF HOURS
Initial diagnosis (morphological characteristics, motor and functional abilities)		Before the implementation of the program
1. Exercises related to the running speed		2
2. Agility exercises		2
3. High intensity jumps		2
4. Exercises of functional abilities	4.1 Sprints with acceleration	2
	4.2 Interval sprints	2
5. Fartlek		2
6. Strength exercises	6.1 Exercises for strengthening the lower extremities	2
	6.2 Exercises for strengthening the muscles of the abdominal wall	3
	6.3 Exercises for strengthening the upper extremities	2
	6.4 Strength exercises with medicine balls	2
7. Explosive strength exercises		4
8. Exercises for the development of flexibility		3
9. Exercises for the development of coordination		2
10. Exercises for the development of the anaerobic capacity		2
11. Exercises for the development of the general stamina		2
12. Stretching exercises		2
Final diagnosis (morphological characteristics, motor and functional abilities)		After the implementation of the program
Hours in total:		36

CONCLUSION

The work related to the implementation of the experiment was set so that each group of subjects can implement 36 training hours. Seven anthropometric measures, twelve motor and three functional tests were applied at the initial and final measurement in both of the groups of the respondents. The subject of the research are morphological characteristics, motor and functional abilities of karate students of the experimental group. The subject of research is also the model of adaptive physical training exercises. The problem of the research is the examination of the statistically significant impact of the training model on the improvements of certain anthropological characteristics of the experimental group.

The following conclusions were made:

On the basis of the problem and the subject of the research, as well as the stated research aims, the following hypotheses were constructed:

H_1– Statistically significant *differences* of the results in the anthropological characteristics between the experimental and control group at the initial measurement are not to be expected.

H_2–There are statistically significant *changes of the results of the morphological characteristics* on the final measurement in relation to the initial measurement at the respondents of the experimental and the control group.

H_3– There are statistically significant *changes of the results of the motor abilities* on the final measurement in relation to the initial measurement at the respondents of the experimental and the control group.
H_4–There are statistically significant *changes of the results of the functional abilities* on the final measurement in relation to the initial measurement at the respondents of the experimental and the control group.
H_5–There are statistically significant *changes of the results of the morphological characteristics* on the final measurement between the respondents of the experimental and the control group.
H_6–There are statistically significant *changes of the results of the* motor abilities on the final measurement between the respondents of the experimental and the control group.
H_7–There are statistically significant *changes of the results of the morphological characteristics* on the final measurement between the respondents of the experimental and the control group.
H–Statically significant effects of the training model on the development of certain anthropological characteristics at the respondents of the experimental group are expected.
Acceptance and rejection of the hypothesis is determined to be at the level of P = .05.

The significance of the research

The conducted research has confirmed that there are effects of the impact of the selected motor exercises training model on the development of anthropological dimensions of the karatists in the experimental group.

It has been demonstrated that with the proper intensity, duration and frequency of the application of the selected motor exercises training model, an efficient way of continuous improving of the morphological characteristics, motor and functional abilities of the karatists can be provided.

The scientific contribution of the results of the research can be observed primarily in high-quality. As an original contribution to science, this research gave an answer to the question of the purposefulness and effectiveness of the application of the selected motor exercises training model on the transformational processes of anthropological characteristics at karatists.

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UTICAJ MODELA TRENINGA NA RAZVOJ ANTROPOLOŠKIH KARAKTERISTIKA KARATISTA

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Sažetak: *Osnovni cilj istraživanja je utvrđivanje efekata modela treninga karatista na razvoj antropoloških karakteristika kod eksperimentalne grupe. Predmet istraživanja su morfološke karakteristike, motoričke i funkcionalne sposobnosti karatista eksperimentalne grupe. Predmet istraživanja predstavlja i model treninga adaptivnih telesnih vežbi. Problem istraživanja je ispitivanje statistički značajnog uticaja modela treninga, na poboljšanja određenih antropoloških karakteristika eksperimentalne grupe. Uzorak ispitanika čine 104 studenta karatista Državnog univerziteta u Novom Pazaru, uzrasta od 19 do 22 godine. Celokupni uzorak ispitanika bio je podeljen na dva subuzorka: Prvi subuzorak čine 40 ispitanika definisani kao eksperimentalna grupa. Ova grupa je bila obuhvaćena modelom treninga na razvoj antropoloških karakteristika, tri puta nedeljno po 60 min, u trajanju od dvanaest nedelja. Drugi subuzorak sa 64 ispitanika čini kontrolnu grupu. Ova grupa je bila obuhvaćena trenažnim procesom u svojim karate klubovima tri puta nedeljno po 60 min, u trajanju od dvanaest nedelja. Rad u procesu realizacije eksperimenta bio je postavljen da svaka grupa ispitanika realizuje 36 trenažnih časova. Primenjeno je na inicijalnom i finalnom merenju kod obe grupe ispitanika sedam antropometrijskih mera, dvanaest motoričkih i tri funkcionalna testa. Analiza kovarijanse je pokazala da se eksperimentalna grupa na finalnom merenju statistički značajno razlikuje većim nivoom morfoloških karakteristika, motoričkih i funkcionalnih sposobnosti od kontrolne grupe ispitanika.*

Ključne reči: eksperimentalna i kontrolna grupa karatea, obučena ideja, antropološke karakteristike, analiza varijance, diskriminiisana analiza i analiza kovarijanse.