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CANONIC RELATIONS BETWEEN MORPHOLOGICAL CHARACTERISTICS MOTOR ABALITIES AND SUCCESS IN REPETITIVE AND EXPLOSIVE STRENGTH OF YOUNG KARATE PLAYERS

ABSTRACT

The research is done on the sample of 70 elementary school pupils, aged 10 and 11 ± 6 months, who are enrolled in regular physical education classes and karate trainings in sports clubs of East Sarajevo. The main problem of this article is to find statistically significant relations between single latent dimensions of the corresponding morphological characteristics and repetitive strength of the young players. Finding out about this relation is very important for certain sports activities so that, on one hand, wanted anthropological harmony could be checked and kept and, on the other hand, so that wanted training technology and actualization of the programme contents could be realized. The aim of this research is to determine the statistically significant relations between the system of anthropometric measures and longitudinal dimensionality of the body, circular dimensionality and body weight and underskin fat, on one hand, and variables of repetitive strength, on the other hand, among young karate players, so that the functionality of their development could be checked and, if possible, so that valuable and appropriate projections of their wanted development could be determined. Seven anthropometric measures of morphological dimensions that define longitudinal skeletal dimensionality, transversal skeletal dimensionality and body weight were used. Repetitive strength was assessed by use of three tests. The results of canonical correlational analysis showed that there is one significant canonical factor and a high level of connectedness between morphological dimensions (as a predicatory system) and explosive strength (as a critera system).

***Key words**:* Young karate players, morphological dimensions, repetitive strength, cannonical correlation analysis

l. Introduction

In karate there is a need for a well-organized and well-led process of training. In order to organize a sports training in such a way one needs to base it on the latest scientific results as well as to use a contemporary and efficient methodological procedure. The reserach on the influence and releationship of morphological characteristics with other dimensions of the antrophological sphere, and through this on the achievemnet of higher sports results as well, is one of the primary goals.

Karate players are usually taller, of a strong and proportional built and with a very small amount of underskin fat. Their long limbs make it possible to hit at a larger distance, and at the same time they provide bigger distance from the opponent while in the main posture and therefore they also provide a relative protection from his hits. The importance of long limbs becomes even bigger if we have in mind the fact that the basic and most effective techniques of hitting are, actually, two direct hits (zuki and maye geri), which are performed from the biggest allowed distance from which hitting the aim is still possible. Karate players have got long and elastic musculature which allowes for fast and explosive movements withs a big amplitude. Bigger amounts of underskin fat are a burden for karate players, they slow down their movements and therefore they are not characteristic for them (*Kuleš,1985;Bratiæ, 2005; Vidranski i sar., 2007*).

There is no doubt that getting a deeper insight into the reletaion beetween antropometric measures and sports results and dimensions of the motoric abilities would make the process of selecteting people who would be talented for karate more efficinet which would considerably improve the development of this sport and, at the same time, improve the achievement of higher results.

In scientific and specialized literature (*Kurelić, Momirović, Stojanović, Šturm, Radojević, Viskić-Štalec, 1975; Pržulj, 2006*) repetitive strength is most often represented as the ability for a long-lasting work out based on the alternation of contractions and relaxation of arm, leg and torso muscles, long performace of a particular movement without lowering the efficency – namely, longer performance with the same intensity. Since the coeficent of the inborn repetitive strength is (H2 = .50), there is a big possibility for its development, therefore it is suggested that it should be developed separately, but also together with other motoric tests, which means as early as in childhood (*Bompa, 2006; Milanović, 2007*).

The main problem of this article is to find statistically significant relations between single latent dimensions od the sorresponding morphological characteristics and repetitive strength of the young palyers. Finding out about this relation is very important for certain sports activities so that, on one hand, wanted antrophological harmony could be checked and kept and, on the other hand, so that wanted training techonology and actualization of the programme contents could be realized.

The aim of this reserach is to determine the statistically significant relations between the system of antropomotoric measures and longitudinal dimesionsonality of the body, circular dimensionality and body weight and underskin fat, on one hand, and variables of repetitive strength, on the other hand, among young karate players, so that the functionality of their development could be checked and, if possible, so that valuable and appropriate projections of their wanted development could be determined.

2. Method

The research is done on the sample of 70 elementary school pupils, aged 10 and 11 ± 6 months, who are enrolled in regular physical education classes and karate trainings in sports clubs of East Sarajevo.

Seven anthropometric measurements of morphological dimensions were used in order to diagnose anthropological dimensions of young karate players.1. *longi*tudinal

skeletal dimensionality: body height (BODHIG) and arm length (ARMLEN); 2. circular dimensionality and body weight: average bust measurement (MEABUST), shin measurement (MESHIN) and body weight (BODWEI); 3. underskin fat: stomach skin folds (FOLSTOM) shin skin folds (FOLSHI). The suggested model sample of anthropometric measures for the assessment of the morphological characteristics is used at the suggestion of the International biological programme (*Lohman et al., 1988*). Repetitive strength is tested by the following tests: lifting up the torso on the Swedish bench (MLTSB), mixed push-ups (MPUU) and squats (MSQT). Measuring instruments for the repetitive strength assessment are taken form the research done by *Kurelić et al., 1975.*

In order to determine the relationship between two different multidimensional anthropomorphological manifest variables, where the anthropometric measurements are the first and the tests of repetitive strength the second system, the method of canonical correlation analysis was used. In order to determine their interrelation programme SPSS 12.0 and statistics 7.0. were used.

3. Results

Table 1. Canonical correlation analysis of morphological characteristics and repetitive trentght at multivariant level

Can R	Can R^2	Chi-sqr.	df	p
.68	.47	56.32	70	.00

Legenda: coefficient of canonic correlation (R), coefficient of determination (R^2), Chi-suare test (Chi-sqr.), degree of freedom(df.), significance (p)

The results of canonical correlation analysis show (table 1) that in the relationship between the system of a predicator, which consists of the anthropometric measurement for the assessment of the morphological characteristics and criteria, that, in turn, consists of variables for the repetitive strength assessment, one statistically significant factor Can R, which with the percentage of 68% considerably explains the level of connectedness between the set of predicative variables and criteria. The coefficient of determination (Can R2) indicates that the percentage of the common variance for both sets of variables is 47%. Canonical factor is statistically significant at level P = .00, which is confirmed by Chi-square tests (Chi-sqr.) with a high coefficient (56.32).

Having in mind the coefficient of canonical correlation and common variance, it can be concluded that the repetitive strength of the tested ones will be strongly correlated with their morphological characteristics.

Table 2. Canonical factors predicatory antrophomotoric measurements

Anthropometric measuers	Root 1
BODHIG	0.24
ARMLEN	0.20
MEABUST	**0.62**
MESHIN	**0.48**
BODWEI	**0.39**

FOLSTOM	-0.26
FOLSHI	-0.32

Table 2 shows that the following antrophomotoric measurements of the circular skeletal imensionality and body weight have the biggest projection on the cnanonical factor: bust measurement (r = 0.62), shin measurement (r = 0.48 and body weight (r = 0.39), and therefore they condition considerably the results in all the tests of repetitive strength. The measurements of longitudinal skeletal dimensionalty and underskin fat have the smallest and the least significant projection on the canonical factor.

Table 3. Canonical factors of repetitive strength criteria variables

Variables	Root 1
MLTSB	0.52
MPUU	0.43
MSQT	0.36

Results in table 3 show torso lifting on a Swedish bench have got the biggest projection on the canonical factor (r = 0.52), mixed push-ups less so (r = 0.43) while squats have got the smallest projection (r = 0.36).

4. Discussion

Canonical correlation analysis in tables 1 to 3 show that antrophomotoric measures (body height, leg lentgh arm length, average bust measurement, shin measurement and body weight), as predicatory system, have got statistically significant relationship with the results achieved in relation to repetitive strengthachieved (torso lifting on a Swedish bench, mixed push-ups, and squats, as a system of criteria, among the young karate players.

In both, scientific and specialized literature (*Kurelić et al. 1975; Malacko and Rađo, 2004*) morphological characteristics are defined as a set of manifest anthropometric measures that are relevant for research in physical culture transformed, by way of factor procedures into latent morphological dimensions.

On the basis of the results of anthropometric measurements that were diagnosed with sports players of both sexes, the aims and tasks of the training work can be set and programmes for activities management can be planned for certain training cycles in order to raise the level of anthropometric measure that we want to influence in the training process.

Since the coefficient of the inborn longitudinal skeletal dimesionality ranges from .98 - 100 %, there is a possibility for development, but to a lesser degree, therefore it is suggested that it should be developed together with other morphological characteristics, which means, as early as in childhood (*Malacko, 2002*). Underskin fat, with regard to almost all the sports activities, represents the parasite factor with the possibility of transformation of 50%.

Repetitive strength can be defined as the ability of muscles to exert power in a training regime (*Malacko and Rađo, 2004*). For this kind of strength the ability of long-lasting work that is based on alternating contractions and relaxation of the torso muscles is

characteristic, almost in all the sports activities, depending on age and/or sex, but it is most often used for long-lasting athletic running and walking, since those represent typical training and competition programme.

In relation to this, it can be concluded that because of earlier sexual development in comparison to girls, differential repetitive strength is not well-developed, however it is comprised in the complexity of morphological characteristics, which means that, they realise repetitive strength thanks to higher values of anthropometric measures and repetitive strength (in regulation of the intensity and exciatation)

According to some researches (*Kurelić et al. 1975; Bompa, 2006; Milanović, 2007*) the factor that regulates the intensity of excitation, most probably, depends on the device for excitation control in the primary motor and in those subcortical cores which have got the role of amplifiers and modulators. Some other researches agree with this as well (*Kurelić et al.. 1975; Bompa, 2006; Milanović, 2007*). In their researches they emphasized the same parameters for more efficient realization of repetitive strength, but here we should keep in mind the fact that this dimension is also, in large measure, influenced by flexibility, the quality of sports technique and bio-chemical situation at the periphery of the locomotor system.

5. Conclusion

The results of this research show that between anthropomotoric measures as a predicatory system and repetitive strength, as a criterion, there is a systematic connectedness, which is ndicated by hight projection of morphological dimensions measures and tests of the influence of repetitive strength on a canonical factor.

The achieved results will contribute to rationalization of work with young karate players from East Sarajevo, elementary school pupils, aged 10 and 11, becauses, during the training process, specail attention will be paid to the development of those morphological dimensions (circular skeletal dimesionality and body weight) which best explains the achieved results in repetitive strenght and at the same time the achievemnt of higher sports results.

Apart from this, the results of morphological dimensions and repetitive strenght will contribute to individualaziation of the training process since planning, programming, raealization and control of the training process will be adjusted to the individual abilities and characteristics of young karate players.

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