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The Effect of Motor Abilities on Karate Performance

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A B S T R A C T

The aim of the study was to identify the motor structures that determine achievement of top results in karate. The study included a sample of 85 karateka aged 18–29 years, competing as senior category athletes of the Croatian Karate Society. Fourteen motor tests (9 basic motor tests and 5 specific motor tests) were used to assess technical efficiency; fighting efficiency was estimated on the basis of results achieved at a number of contests. Factorial analysis of the basic set of motor variables indicated the presence of three major factors of coordination, explosive strength, and movement frequency. Factorial analysis of pooled basic and specific motor variables also pointed to three major factors of speed (basic and specific), controlled power (explosive strength and specific agility), and basic coordination. Regression analysis showed the isolated basic factors to significantly determine both technical and fighting efficiency of the karateka, with the major role of the factor of explosive strength (power). Regression analysis of pooled basic and specific factors revealed the factors of controlled speed and controlled power to predominantly determine the karateka fighting and technical efficiency. In the set of tests used to assess specific motor abilities in karate, the speed of blockade, the speed of moving in multiple directions, and frequency of foot kicking were found to be the best predictors of technical efficiency, whereas the speed of moving in multiple directions, the speed of blockade, and frequency of foot kicking were the best predictors of fighting efficiency.

***Key words**: elite karateka, motor parameters, fighting efficiency*

Introduction

Mastering motor skills (techniques) in karate and their efficient use in fight require longstanding, strenuous training. The fight dynamics and high movement frequency are especially emphasized, necessitating from a karateka a high level of motor and functional abilities, speed and strength[1], and coordination[2] in particular. Although of a relatively short duration, karate fights are characterized by maximal intensity, thus only the entities capable of enduring these demanding conditions can hold out in elite karate contests. Quite frequently, persistent and persevering training may prove inadequate, as specific predisposition is needed to achieve top results. All these reflect on the formation of an appropriate anthropologic complex of a karateka. Karate training leads to adjustment of the morphological subsegment of the anthropologic complex optimizing the morphological structure according to the requirements of this particular sport[3]. As for the genetic determination of the skeleton longitudinal as well as transverse dimensions, karate training will result in an optimal muscle mass increase relative to the level of skeleton development, and in adipose tissue reduction[3].

High quality and elite karate selections are predominated by the karateka of the mesomorphic and ectomorphic constitution types[4,5], whereas endomorphic somatotype is rarely found, even in the heavyweight category.

In karate, only the karateka with potentially above-average motor abilities, primarily explosive strength, speed and coordination, can achieve top results; it is especially pronounced in karate blows performed in combination, such as jaku zuki-mawashi geri and kizame zuki-jaku zuki[3]. It is just the speed and quality of performing these actions (techniques) that influence directly the attack efficiency in karate.

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Sforza et al. (2001)[6] and Sforza et al. (2002)[7] analyzed the quality, i.e. technique efficiency on the basis of variability in the repeat technique performance monitored by a photoelectronic instrument. The method can be useful in learning, i.e. in acquiring and subsequent mastering particular karate techniques.

Upon achievement of top quality in performing particular karate techniques, the speed of reaction and the skill of predicting the opponent's attack are crucial for success in karate[8].

The aim of the study was to identify the motor structures that determine achievement of top results in karate. To this end, motor structures were identified, and the impact of these structures/factors on the criteria of technical and fighting efficiency was determined in order to get comprehensive information on the issue.

Material and Methods

The study included a sample of 85 karateka aged 18–29 years, at least brown-belt owners competing as senior category athletes as members of the Croatian Karate Society. Measuring instruments covering specific psychomotor space segments were employed on assessment of primary motor abilities: explosive strength (standing long jump, standing high jump, and throwing medicine ball from supine position); movement frequency (hand tapping, foot tapping, and hand rotation); coordination (figure eights with bending, hand and foot tapping); and equilibrium (standing with both feet in transverse position on the bench with the eyes closed).

On choosing tests for assessment of the situation motor abilities, due care was taken to select the tests that provide best estimate of the most important factors of fight performance, i.e. specific speed (speed of technique performance) and specific agility-mobility (speed of specific movements):

1) speed of the *gedou barai* blockade technique performance; the task was to perform as many blockades during 30 seconds from the initial fighting posture as possible, in three repeats; test result was recorded as the sum of overall correctly performed blockades;
2) speed of blockade performance and hand blow as a combined technique; the task was to perform the *gedou barai – jaku zuki* combination five times consecutively at maximal speed. In order to ensure identical test conditions to all study subjects, the tall and short ones alike, the distance of the target to be hit by *jaku zuki* blow was measured by the subject's distance from the target, defined by the extended arm performing *jaku zuki*. On the sign given by the timekeeper, the subject started performing the *gedou barai – jaku zuki* combination from the fighting posture as fast as possible. The combination had to be performed five times, the last *jaku zuki* blow against the wall *makiwara* or vertically placed gym mattress denoting the task completion. The task was repeated three times, and test result was measured in tenths of second;
3) speed of the *mawashi geri* foot kick technique performance; the task was to perform as many *mawashi geri* kicks against the punch bag during 30 seconds from the initial fighting posture. The kick level was determined according to the subject's body height, whereby each subject was to reach at least his own neck level. The respective level to be reached was marked by a belt above which the kick had to be performed. The task was repeated three times, and the result was recorded as the overall number of properly performed *mawashi geri* kicks against the punch bag;
4) side steps on taking guard with hands lifted up; the test is used to estimate specific movement speed. The task was to pass the four-meter distance as fast as possible by side steps in both directions six times. The test was repeated three times with due time allowed for rest in-between, and the result was measured in tenths of second; and
5) speed of movement in a triangle; the test is used to estimate specific movement speed. The task was to move as fast as possible in fighting guard along the sides of an equilateral triangle of 3 m in dimensions, marked on the floor. The subject moved fast from one vertex along the side to another vertex, around the medicine ball placed there, then turning back sidewise towards the third vertex, again around the medicine ball placed there, to move sidewise back to the initial site. Then he had to move back sidewise, sidewise forward and sidewise back to the start position. The speed of moving along the triangle sides was measured in tenths of second, and the task was repeated three times.

Judgement by four independent karate experts was considered on assessing the karateka fighting success and technique. The experts were well informed on the subjects' activities, having followed them at numerous contests over a long period of time. Two criterion variables were set to estimate technical efficiency and fighting, i.e. competitive efficiency.

1) Technical efficiency – C1TECHN was determined on the basis of subjective evaluation by four judges calculating the first main judgment component in 8 karate techniques. The following techniques were evaluated individually: *jaku zuki, kizame zuki, ushiro mawashi geri* and *mawashi geri*, and in combinations *jaku zuki – mawashi geri, jaku zuki – uraken, ashi barai – ushiro mawashi* and *kizame zuki – jaku zuki.*
2) Fighting efficiency – RESULT defined as an average of all competitive results achieved at world championships, world cups, European championships and national championships.

Factorial analysis was used to determine the karateka motor structure. The algorithm consisted of oblimin transformation of latent dimensions obtained by orthoblique transformation of the characteristic vectors of the variable intercorrelation matrix. Classic regression analysis was used to determine the effect of the identified karateka motor structures on their technical and fighting efficiency.

Table 1 shows basic statistical variable parameters (mean ± standard deviation) and analysis of variance between the karateka weighing <75 kg and >75 kg; oblimin factor complex (OBL) is shown in Tables 2 and 3; whereas Tables 4, 5 and 6 present correlation coefficients of particular groups of predictor variables with a particular criterion (ρ) with the corresponding coefficient of determination (δ), and partial regression coefficients of particular predictor variables and criterion (β), i.e. relevant results of regression analysis.

Results

Differences in the motor test results between the karateka of lower (<75 kg) and higher (>75 kg) categories were analyzed to better describe the motor and specific motor characteristics of the subject sample illustrated in Table 1. The karateka differed in the results of basic and specific motor ability tests according to weight, in favor of higher weight categories, as revealed by F-tests.

In comparison with <75 kg karateka, the >75 kg karateka showed a significantly higher specific upper extremity movement frequency and speed (speed of block and hand blow) as well as specific frequency of lower extremity movements (foot kicking). The latter were also found to be superior in specific agility in terms of changing movement in multiple directions. These specific abilities of the karateka that were observed to be more pronounced in higher weight categories enable fast, strong and firm performance of the karate techniques, based on the considerably greater muscle mass in these groups.

The tests of basic motor abilities also yielded differences between the karateka weight categeories, which were consistent with those recorded in the tests of specific motor abilities. So, the >75 kg karateka achieved better results in the explosive strength tests, the difference being considerably greater for lower extremities in terms of high jump (SARDENT) than for upper extremities (throwing medicine ball from supine position). Karate techniques of the blow and block type integrate speed and power with muscle tone regulation, thus the tests assessing specific speed (in terms of blow and block performance) are greatly saturated by explosive strength.

In the karateka, basic motoricity and specific motoricity are closely related, which means that these abilities are highly mutually determined, therefore they should also be observed in conjunction. Thus, factorial analysis of the tests estimating basic motor abilities should be accompanied by factorial analysis of the tests assessing basic and specific motor abilities as a unified area. The identification of motor structures is a precondition for programming transformation processes in kinesiologic education[9] and in sports.

Factorial analysis of the tests of general motoricity produced three significant factors, the first of them accounting for as much as 34% of total valid variance (Table 2).

First factor was predominantly defined by high projections of three tests, including two tests assessing coordination and one test estimating equilibrium. These tests are based on the ability of coordination both in terms of fine synergistic regulation of the effectors and in terms of integrating various movements into a complete moving structure. Accordingly, it is a factor of whole body coordination.

Second factor showed highest projections of the tests of throwing medicine ball from supine position, standing high jump and standing long jump. This factor accounted

TABLE 1
DESCRIPTIVE STATISTICS AND ANALYSIS OF VARIANCE BETWEEN <75 AND >75 KG KARATEKA IN TESTS OF BASIC AND SPECIFIC MOTOR ABILITIES

Variable	N=85 X±SD	<75 kg X±SD	>75 kg X±SD	F	p
Standing long jump (cm)	231.75±18.17	–0.13±0.85	0.14±1.13	1.56	0.22
Standing vertical jump (cm)	47.48±9.31	–0.36±0.86	0.37±1.01	12.84	0.00
Medicine ball throw (cm)	945.75±298.7	–0.28±0.95	0.29±0.97	7.60	0.01
Hand tapping (f)	39.47±3.30	–0.13±1.13	0.14±0.84	1.56	0.22
Foot tapping (f)	22.49±2.15	–0.07±0.99	0.07±1.02	0.45	0.50
Hand rotation (f)	39.07±2.93	–0.17±1.03	0.17±0.95	2.44	0.12
Foot and hand tapping (f)	10.95±2.44	0.09±1.08	–0.09±0.92	0.70	0.41
Bench standing (s)	30.34±15.30	–0.02±0.99	0.02±1.03	0.05	0.83
Figure eight with bending (s)#	18.34±1.70	0.07±1.06	–0.07±0.95	0.39	0.54
Sidesteps (s)#	9.84±1.88	0.10±0.96	–0.10±1.04	0.84	0.36
Movement in triangle (s)#	94.59±8.39	0.28±1.00	–0.29±0.93	7.57	0.01
Block–blow (s)#	48.15±8.31	0.35±1.02	–0.36±0.86	11.87	0.00
Gedan barai (f)	540.81±38.54	–0.40±0.96	0.41±0.88	16.33	0.00
Mawashi geri (f)	24.21±2.85	–0.29±0.90	0.30±1.02	8.20	0.01

#variable with opposite metric orientation

TABLE 2
OBLIMIN (OBL) FACTORS IN THE AREA OF BASIC MOTOR VARIABLES

Variable	OBL1	OBL2	OBL3
Standing long jump (cm)	0.18	0.63	–0.13
Standing high jump (cm)	0.21	0.73	–0.17
Medicine ball throw (cm)	–0.16	0.90	0.22
Hand tapping (f)	0.15	–0.13	–0.82
Foot tapping (f)	–0.02	–0.06	–0.79
Hand rotation (f)	–0.18	0.31	–0.66
Hand and foot tapping (f)	0.84	–0.07	0.15
Standing on equilibrium bench (s)	0.85	0.13	–0.01
Figure eight with bending (s)#	–0.62	–0.10	0.32
LAMBDA	3.13	1.56	1.28
Variance %	34.76	17.31	14.22

#variable with opposite metric orientation

for 17% of total valid variance. This factor, defined by the tests of explosive strength, could be called explosive strength factor and/or power factor[10].

Third factor accounted for 14% of total valid variance in the employed tests of general motor abilities. This factor showed highest projections of the tests of foot tapping, hand tapping and hand rotation, intended for assessment of the speed of alternative movement frequency. Thus, this factor could be interpreted as a speed factor.

Factorial analysis of the tests of general motoricity and tests of specific motoricity as a unique set of variables also yielded three significant factors of such a structure suggesting the same mechanisms to be probably responsible for the general motor and specific motor manifestations in elite karateka (Table 3).

However, in this case the speed of performing simple movements – routine and the speed of performing basic karate techniques were the predominant features of elite karateka. This factor defined by the general and specific psychomotor speed accounted for more than 40% of total valid variance in the battery of general and specific motor tests applied. Thus, the speed of karate technique performance is the basis of the elite karateka motor efficiency.

The tests assessing explosive strength (throwing medicine ball from supine position and standing high jump in particular) and tests estimating specific agility – mobility (movement in a triangle in particular) had highest projections on the second isolated factor. This factor integrates basic explosive strength and specific agility into a single factor that could be called the factor of controlled power[10]. The variable of the *gedan barai* blockade frequency, which is saturated with power rather than speed because it is used to block the opponent's violent leg kicks against the lower part of the trunk, had a significant projection upon this factor.

The third isolated factor showed highest projections by the tests of general coordination. In comparison with the same factor isolated in the battery of general motoricity tests, this factor provided least information on the karateka motor characteristics.

TABLE 3
OBLIMIN (OBL) FACTORS IN THE AREA OF BASIC AND SPECIFIC MOTOR VARIABLES

Variable	OBL1	OBL2	OBL3
Standing long jump (cm)	0.18	–0.52	–0.10
Standing high jump (cm)	0.26	–0.73	–0.08
Medicine ball throw (cm)	–0.09	–0.81	0.32
Hand tapping (f)	0.75	0.12	–0.22
Foot tapping (f)	0.84	0.24	–0.01
Hand rotation (f)	0.64	–0.18	0.17
Hand and foot tapping (f)	–0.16	0.01	–0.83
Standing on equilibrium bench (s)	0.10	–0.07	–0.79
Figure eight with bending (s)#	–0.30	0.14	0.62
Side steps (s)#	0.17	0.74	0.29
Movement in triangle (s)#	0.01	0.86	0.11
Block–blow (s)#	–0.58	0.33	0.12
Gedan barai (f)	0.41	–0.54	–0.12
Mawashi geri (f)	0.75	–0.33	0.03
LAMBDA	5.62	1.85	1.58
Variance %	40.13	13.19	11.28

#variable with opposite metric orientation

Having thus defined the primary motor factors in the karateka, relations of these factors with the criteria defining the level of karate performance are illustrated in Table 4. In this way, information is obtained on the impact of particular motor factors underlain by the mechanisms responsible for motor manifestations, on the karateka technical and fighting efficiency.

TABLE 4
RESULTS OF REGRESSION ANALYSIS FOR TECHNICAL AND FIGHTING EFFICIENCY IN FACTORIAL BASIC MOTOR AREA

Factor	C1TECHN β	RESULT β
Coordination	0.22^{**}	0.17^{*}
Power (explosive strength)	0.66^{**}	0.69^{**}
Speed (movement frequency)#	-0.23^{**}	-0.23^{**}
ρ	0.81^{**}	0.83^{**}
δ	0.66^{**}	0.68^{**}

#variable with opposite metric orientation, $^{*}p<0.01$, $^{**}p<0.001$, C1TECHN – first main component of eight karate techniques, RESULT – overall competitive efficiency over a few years, β – regression coefficients, ρ – multiple correlation, δ – coefficient of determination

Multiple correlations were high and significant for both criteria, indicating that the performance in karate cannot be analyzed independently of motor abilities. In karate, performance is greatly determined by the group of isolated motor factors. A respective structure of pre-

dictors is involved in determination of a particular criterion, as indicated by the coefficients of partial regression.

In karate, performance can be quite objectively and reliably assessed from fighting efficiency over years of contests, which integrates the quality of karate technique performance in an appropriate manner (Katić et al., 2005)[3]. Several-year contest efficiency is significantly determined by each of the motor factors isolated, pointing to the criterion complexity.

Explosive strength has a predominant effect on both criteria, thus the ability of maximal energy mobilization being a crucial feature of both fighting and technical efficiency of elite karateka. This ability is also highly saturated with all other motor abilities, especially coordination and speed, due to their close interactions.

Generally, it is concluded that the success in karate is primarily influenced by explosive strength and coordination. The achievement of top results requires above-average abilities that are mostly innate, i.e. genetically determined, and include explosive strength, speed and coordination. Therefore, the selection of entities for karate should be based on these very abilities.

The performance of karate techniques implies motor abilities regulated by the cortical regulatory mechanisms in terms of solving complex motor tasks, tone control, and especially the ability of appropriate inclusion of muscle groups and individual muscles in the manifestation of explosive strength.

Results of regression correlation analysis between the factors isolated in the general and specific motor area, and the criteria used to assess technical and fighting efficiency of the karateka are presented in Table 5. The predicting value of the criteria of both technical and fighting efficiency improved considerably with inclusion of the tests assessing specific motor abilities in the predictor group of variables. Two factors, i.e. two motor structures, predominantly determined the karateka technical and fighting efficiency. Firstly, the factor of controlled power, integrating specific agility and explosive strength, mostly determined technical and fighting efficiency (regression coefficient for technical efficiency and fighting efficiency 0.71 and 0.74, respectively). Secondly, the factor of speed integrating basic and specific speed also determined significantly technical and fighting efficiency (regression coefficient 0.32 both).

The impact of the factor of basic coordination on the criteria was found to subside (especially on the criterion of fighting efficiency) because basic coordination got integrated in the factor of controlled power through specific agility, while motor functioning in the karateka shifted from the cortical to the subcortical level in order to be efficient.

Having determined the correlation of basic motor abilities and specific motor abilities in predicting the criteria of technical and fighting efficiency of the karateka, the next step was to identify the level of determination, i.e. the possibility of predicting these criteria exclusively by use of the battery of tests of specific motor abilities.

The battery of tests used for assessment of specific abilities in karate (Table 6) are good predictors of general fighting efficiency (multiple correlation for RESULT 0.91) and technical efficiency (multiple correlation for C1TECHN) 0.83). The speed of blockade performance was the best predictor of technical efficiency, followed by the speed of movement in multiple directions and frequency of foot kicking. Accordingly, technical efficiency in the karateka is predominantly determined by the abilities of specific speed and agility. The speed of movement in multiple directions is the best predictor of fighting efficiency, followed by the speed of blockade performance and frequency of foot kicking.

The speed of blockade performance is a precondition for successful attack performance. It is important to be able to defend oneself, i.e. not to sustain a blow because it means an advantage for the opponent. A karateka who can successfully block the opponent's blow takes advantage, especially in case of fast counterattack. The speed of reaction and the skill of predicting the opponent's at-

TABLE 5
RESULTS OF REGRESSION ANALYSIS FOR TECHNICAL FIGHTING EFFICIENCY IN FACTORIAL BASIC AND SPECIFIC MOTOR AREA

Factor	C1TECHN β	RESULT β
Speed (basic + specific)	0.32**	0.32**
Controlled power (agility + explosive)#	–0.71**	–0.74**
Coordination#	–0.11*	–0.06
ρ	0.89**	0.91**
δ	0.80**	0.83**

#variable with opposite metric orientation, *p<0.05, **p<0.001, C1TECHN – first main component of eight karate techniques, RESULT – overall competitive efficiency over a few years, β – regression coefficients, ρ – multiple correlation, δ – coefficient of determination

TABLE 6
RESULTS OF REGRESSION ANALYSIS FOR TECHNICAL AND FIGHTING EFFICIENCY IN SPECIFIC MOTOR AREA

Variable	C1TECHN β	RESULT β
Side steps (s)#	–0.15	–0.03
Movement in triangle (s)#	–0.24*	–0.41**
Block-blow (s)#	–0.11	–0.03
Gedan barai (f)	0.35**	0.35**
Mawashi geri (f)	0.19*	0.29**
ρ	0.83**	0.91**
δ	0.69**	0.84**

#variable with opposite metric orientation, *p<0.05, **p<0.001, C1TECHN – first main component of eight karate techniques, RESULT – overall competitive efficiency over a few years, β – regression coefficients, ρ – multiple correlation, δ – coefficient of determination

tack are of utmost importance for successful performance in karate[8].

Specific agility, i.e. karateka mobility in different directions, is of great importance for fighting performance. High mobility enables the opponent's attacks to avoid and optimal position for efficient performance of one's own techniques (blockade and kicks) to take. Specific agility is greatly saturated by basic coordination because the ability of changing the direction of movement is one of the factors of coordination and is even more associated with explosive strength. As there is an interactive association between explosive strength and coordination, this can be viewed as a mechanism of regulated power.

Specific speed is mostly saturated by the basic psychomotor speed, thus it is based on the mechanism responsible for speed regulation.

Discussion

Factorial analysis of the tests of basic and specific motor abilities clearly shows the basis of the karateka motor activities, which is consequential to the very nature of karate as a sport. In the fighting conditions, the speed of action performance plays a crucial role in both defense and successful attacks, whereby explosiveness is of great importance. Physiologically, explosiveness manifests in the activation of a great number of muscle units within a short period of time. Physically, explosiveness is mass mobilization or change of movement direction, i.e. performance of the initial conditions of concrete movement by acceleration. Of course, it is by no means irrelevant what these initial conditions of movement are, because wrong motion and/or particular karate techniques will produce poor results. Thus, there is no successful performance of karate techniques without appropriate initial conditions. The coordination abilities of one's own spatial positioning and the activation of complex motion, along with explosive actions of moving and stopping the body are the most complex forms of all movements, including those in sports activities. This is especially pronounced in contact sports such as karate, where the opponent is at the same time the target of action, there is no activity without an opponent, and the objective is destruction of the opponent. Therefore, there is one's own movement in fight, which is to a great extent dependent on the opponent's position and movement.

Acquiring karate techniques is a long-lasting process that depends on both basic motor abilities and specific motor abilities. The motor karate skills as well as the general and specific motor abilities are integrated in the morphological system with time[9–11], optimizing the magnitude and relations of the karateka somatotype components.

Study results revealed the karate techniques to be predominantly determined by explosive strength, followed by coordination, i.e. the basic motor abilities regulated by the cortical mechanisms, which are innate and therefore cannot be significantly influenced upon by any kinesiologic treatment. That is why top results in karate can only be achieved by the karateka with potentially above-average motor abilities, primarily explosive strength and coordination, which are then integrated in the general motor efficiency through karate training. This integration is the basis for the development of motor functioning in kinesiologic education[12–15,11] and sports[16–20].

Technique performance is considerably saturated by cognitive abilities because a karateka has to identify current situation in the shortest time possible, and to choose the reaction that is most appropriate to achieve the objective, i.e. to defend the opponent.

According to Katić et al.[3], the best predictors of general fighting efficiency are karate blows performed in combination: *jaku zuki-mawashi geri* and *kizame zuki-jaku zuki*. This means that the ability of integrating different motor skills, i.e. acquired routines, into a unique structure is the major precondition for a karateka fighting success. In contrast, fighting success is warranted by the ability to perform a combination-series of blows rather than by quality performance of individual blows. Furthermore, Katić et al.[3] point to *kizame zuki* as the only one of individually performed blows that has a certain favorable impact on the fighting success. Similar to straight blow in boxing, *kizame zuki* enables control of the opponent's attack, i.e. interferes with and prevents the opponent's attack, at the same time allowing for more appropriate preparation of one's own attack or counterattack.

The tests of specific, i.e. situation motoricity of the karateka are to a great extent saturated with the level of motor skill acquisition, and estimate specific speed (kick and blockade performance) and specific agility. Accordingly, specific speed is the ability of fast performance of as a rule multiple blows and blockades (in a series), whereas specific agility is the ability of using controlled explosive strength and/or power for efficient karateka mobility. These two specific abilities of the karateka also integrate all other basic abilities, explosive strength, speed and coordination in particular. Explosive strength will thereby influence performance of all tests of situation motoricity. Besides explosive strength, the speed of technique-blow performance and specific agility will also be influenced by the ability of movement frequency and coordination, respectively.

The high level of specific motoricity test determination by technical and fighting efficiency in elite karateka indicates that the level of training and/or shape can be properly followed by the assessment of specific agility (using the test of movement in multiple directions) and specific speed (using the tests of *gedan barai* blockade frequency and *mawashi geri* foot kick frequency). Therefore, it is unnecessary to waste time on basic motoricity testing for training follow up in elite karateka.

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UTJECAJ MOTORIČKIH SPOSOBNOSTI NA USPJEH U KARATEU

SAŽETAK

Cilj rada je bio da se izvrši identifikacija motoričkih struktura koje determiniraju postizanje vrhunskih rezultata u karateu. U tu svrhu istraživanje je izvršeno na uzorku od 85 karatista, natjecatelja u borbama seniorske kategorije Hrvatskog karate saveza, a starosna dob ispitanika kretala se u granicama 18–29 godina. Na ispitanicima je primijenjeno 14 motoričkih testova (9 testova bazične i 5 testova specifične motorike), te izvršena procjena tehničke efikasnosti, kao i procjena borbene efikasnosti na temelju postignutih rezultata sa većeg broja natjecanja. Faktorska analiza bazičnog skupa motoričkih varijabli utvrdila je postojanje tri značajna faktora i to: koordinacije, eksplozivne snage i frekvencije pokreta, a bazičnog i specifičnog motoričkog skupa varijabli zajedno, postojanje tri značajna faktora i to: faktor brzine (bazične i specifične), faktor regulirane sile (eksplozivne snage i specifične agilnosti) i bazične koordinacije. Regresijska analiza je pokazala da svi izolirani faktori u bazičnom prostoru značajno determiniraju kako tehničku tako i borbenu efikasnost karatista, a najviše faktor eksplozivne snage (sile), dok je regresijska analiza u bazičnom i specifičnom prostoru zajedno, pokazala dominantnu determiniranost faktora regulirane brzine, te regulirane sile s borbenom i tehničkom efikasnosti karatista. Od primijenjenih testova za procjenu specifičnih motoričkih sposobnosti u karateu najbolji prediktori tehničke efikasnosti su brzina izvođenja blokade, zatim brzina kretanja u više pravaca, te frekvencija udarca nogom, a najbolji prediktori borbene efikasnosti su brzina kretanja u više pravaca, zatim brzina izvođenja blokade, te frekvencija udarca nogom.