THE INFLUENCE OF THE SPECIFIC MOTORIC ABILITIES AND KNOWLEDGES ON THE KARATE KATA PERFORMANCE IN YOUNG KARATE PLAYERS

Marijana Čavala[1], Josefina Jukić[1] and Mile Čavar[2]

[1] Faculty of Kinesiology, University of Split, Split, Croatia
[2] Faculty of Science and Education, University of Mostar, Mostar, Bosnia and Herzegovina

Abstract

The aim of this research was to define mutual determination of the specific motoric abilities (situational karate tests), motoric knowledge (karate techniques) and success in performing karate kata in young cadets and cadets aged 11-12 and 13-14 years. With this aim, the group of 6 situational motoric tests was applied on the sample of 40 younger cadets and 40 cadets, alongside with assessment of 6 basic karate technique elements. The variable of the criterion was made of the overall grade of the 2 karate kata as kata success. The regression analysis showed that the best kata performance success predictor in young cadets is, except for the specific agility, the speed of the gedan barai- gyaku tsuki combination (block kick) performance, while the best predictor in cadets is gedan barai blockade speed performance. Among the karate techniques (kicks) applied, the best predictor of the kata efficiency performance in young cadets is the quality of the mawashi geri and gyaku tsuki -uraken realisation, while in cadets the best success predictor is the quality of the kizame tsuki -gyaku tsuki kick performance. It is evident that agility as a motoric ability dominates the karate sport, it interlaces through the energetic fight position movements, and fast and explosive hand swings, abundant in the karate katas. The alternate lunges, turns, swings, kicks and blockades demand a high level of a karate player`s specific motoric abilities development and technical efficiency.

Key words: *karate, specific motorics, technique, kata, regression*

Introduction

Success in sports is a phenomenon of the interdisciplinary relation of several factors, primarily: morphological characteristics, motoric abilities, psychological state, physiologic functions, life environment and sociocultural context. Knowledge about the physical characteristics of athletes can give insight into morphological and motoric factors that have an important and sometimes decisive influence on the characteristics of sports success (Blackburn, 1994). The interesting fact is that today, in the 21st century, very little research in the world has been done on the sample of karate players. With the aim of conducting an adequate transformational process of athletes, it is necessary to gain insight into their actual state, and to set a realistic goal which is to be achieved. To make this possible, a model values should exist, for each individual sport, towards which every athlete should strive. However, such model (specification equation) does not still exist for karate players, and an important parameter in determining success in sports should be defined in close future. In constructing a statistically significant and applicable model for karate, it is necessary to determine the anthropological characteristics of top athletes, define specific variables (situational), which are responsible for efficiency in this sport, determine the success criteria for this sport, with the data concerning the contribution of the anthropological and specific variables to this success, and finally, to define reliable measures that would help in predicting success. Only using the methods previously described it is possible to gain relevant data and conclusions about all the aspects of karate as a sport, including anthropometric, morphological, motoric, conative, cognitive...Consequently, with the aim of improving karate and defining important parameters that would set new foundations and higher value of karate as an Olympic sport, the author decided to define the influence of the motoric characteristics and technical knowledge on the karate kata success.

Previous researches

Although an attractive and popular sport, judging by the number of karate players (but not so popular judging by the investments), karate had only a few modest attempts in scientific explanation of the background of an individual contestants` fight success. Sforza et al. 2001 and Sforza et al. 2002 analysed the quality, that is, the efficiency of the technique, based on the deviation-variability in performing the technique in several attempts, what was controlled by the photo-electric instrument. The application of this method is useful in learning, that is, acquisition of certain karate techniques and their further perfection. Karate training in young karate players influences the development of flexibility, muscle power and balance. It is certain that after reaching the highest quality in performing certain karate techniques the reaction speed and the opponent attack prediction skills have a decisive importance in karate success achievement (e.g. Mori et al., 2002). Katić et al. (Katić et al. 2005) list combined karate strikes as the best general fight efficiency predictors; combinations such as gyaku tsuki -mawashi geri and kizame tsuki -gyaku tsuki. Further on, Katić et al. claim that only kizame tsuki of all individual strikes has a certain amount of positive influence on the fight

success. Front direct in boxing enables the control of the opponent`s attacks, similarly as kizame tsuki in karate, it blocks and interferes with the opponent`s attack and enables better attack or counterattack preparation. Tests of the specific, that is, situational motoric of karate players are significantly saturated analogously with the level of acquisition of the motoric skills, and they estimate the specific speed (strikes and blocks realisation), and specific agility. So, specific speed is the ability of quick realisation of several strikes and blocks (in series), and specific agility is the ability of applying regulated explosive power and/or power with the aim of efficient karate player mobility. These two specific abilities integrate all other basic abilities, and especially explosive power, speed and coordination. The explosive power will influence the realisation of all situational motoric tests. Except for the explosive power, the ability of movement frequency will influence the technique-strikes realisation speed, and coordination will influence the specific agility (Blažević et al., 2006). Previous results show that in every individual contact sport, the training results in integration of specific and basic motoric, in the sense of appropriate integration of explosive power, speed and coordination into general motoric efficiency and/or appropriate motoric system, optimal for achieving top results in individual contact sport.

Aim of the research

The aim of this research is to define the influence of the specific motoric skills and knowledge of young karate players on the efficiency of the karate kata performance, and to find which motoric abilities and knowledge influence the karate kata success. To gain the information about the development of specific motoric abilities and knowledge that determine the achievement of top results in karate katas, a comparison is given, regarding the influence of specific motoric abilities on the kata performance efficiency in relation to age, that is, between the groups of younger cadets and cadets. The secondary goal would be establishing the existence of the statistically significant difference in specific motoric abilities and knowledge between the two subgroups of karate players in relation to age.

Hypotheses

The general hypotheses, based on the problem and the aim of this research, is: H_0 - statistically important influence of motoric abilities and knowledge on kata performance does not exist
H_1 - statistically important influence of motoric abilities and knowledge on kata performance exists.

Methods

The sample of entities
The research was conducted on the sample of 80 young karate players, divided into groups of boys aged 11-12 years (N=40) and boys aged 13-14 (N=40) in the city of Split.

The sample of the variables
In choosing the specific motoric abilities evaluation tests the best tests for evaluating the most important karate success dimensions have been considered, dimensions such as: arm movement speed, arm and leg technique performance speed, specific movement speed and specific hip joint flexibility. Six battery tests were conducted:
1.   Dominant arm movement speed (BRZRE). The speed of gedou bara block technique was evaluated by the horizontal arm abduction.
2.   Combination performance speed evaluation test was aimed at the evaluation of the gedou barai block technique performance speed and gyaku tsuki arm strike (SBLOKUD).
3.   Mawashi geri leg strike technique performance speed (SMAWAFRO).
4.   Specific hip joint flexibility (SMAWASHI) which is greatly responsible for successful high performance of the most efficient leg strike mawashi geri.
5.   Side steps (SKUS). The test is aimed at specific movement speed evaluation.
6.   Specific movement speed (STROKUT). The evaluation of the movement direction alteration, laterally and in other directions, especially of those that are often used by the karate players during the fight (forward at a 45 degree angle and backwards at the same angle).

Technical efficiency evaluation – TEHNIKE
Was determined based on the subjective evaluation of the three assessors, by calculating the first main components of the grades, using the six karate techniques.
The following techniques were individually evaluated:
1.   Gyaku tsuki
2.   Kizame tsuki
3.   Mawashi geri
And the following technique combinations:
4.   Gyaku tsuki – mawashi geri
5.   Gyaku tsuki – uraken
6.   Kizame tsuki – gyaku tsuki

Technical efficiency – KATE
Was determined based on the subjective evaluation of the three assessors on two karate katas performance. The result in this variable was determined as a sum of the average grade for 1 and average grade for 2 kata.

Data processing methods
After conducting measuring and arranging data, a statistical data processing began, using the Statistica ver. 7.1. program. The data was processed by the descriptive statistic method: the basic statistic indicator parameters – arithmetic mean (X), standard deviation (SD), median (Me) and minimal and maximal value (MIN and MAX) were analysed, for the overall number of the karate players. In defining the influence of the specific motoric abilities and technical knowledge of the young karate players on their efficiency in performing karate kata, a classic regression analysis has been applied.

Results and Discussion

Basic statistic parameters (Table 1) show that all the situational motoric space variables, karate kata techniques and karate kata performance success criterion variable are normally distributed and there is no extreme data dispersion, what is important for future statistic processing. It is obvious that technique elements, in relation to the situational-motoric variables, have somewhat higher values and some of them even reached the limit of normal distribution, what is expected. Since these tests are relatively technically demanding, it is probable that the large age span of the examinees influenced the variables distribution polarization; the results lean towards the lower values in younger examinees, who find these tests too demanding, or towards the higher values in older examinees, whose greater motoric potential and karate technique of greater quality enable their more efficient execution.

Table 1. The descriptive variable statistics (N=80)

Variables	AS	MIN	MAX	SD	MAXD
Specific motoric abilities					
Side steps[#] (s)	10.15	8.55	13.36	1.00	0.07
Triangle movement[#] (s)	9.46	8.10	11.86	0.79	0.06
Block-strike[#] (s)	28.64	17.33	39.33	4.87	0.07
Gedan barai (f)	4.29	3.00	5.90	0.64	0.05
Mawashi geri (f)	25.41	18.00	32.67	3.21	0.08
Mawashi geri (amplitude)	162.84	137.33	195.00	13.93	0.09
Karate techniques					
Gyaku tsuki	2.96	1.00	4.33	0.84	0.12
Kizame tsuki	2.80	1.33	5.00	0.82	0.15
Mawashi geri	2.58	1.00	5.00	0.98	0.14
Gyaku tsuki – mawashi geri	2.58	1.00	4.67	0.91	0.18
Gyaku tsuki – uraken	2.52	1.00	4.00	0.81	0.16
Kizame tsuki – gyaku tsuki	2.83	1.00	5.00	0.88	0.15
					Criterion variable
Kate	2.71	1.17	5.00	0.84	0.11
					TEST = 0.18

AS – arithmetic mean, MIN – minimal result, MAX – maximal result, SD – standard deviation, MAXD – empirical relative cumulative frequency deviation from the theoretical cumulative frequency

The group of tests applied in evaluating specific karate abilities (Table 2) is a good predictor of technical efficiency in the sense of karate kata realisation (multiple correlation – ρ and determination coefficient – δ are significant on the $p<0.01$ level in both samples of examinees). In boys aged 11-12 years, the biggest regression coefficient with a criterion is found in specific agility estimation test, that is, lateral mobility, and also gedan barai – gyaku tsuki combination realisation speed test. In boys aged 13-14 years, the biggest regression coefficient with a criterion is found in gedan barai block frequency speed tests and in mawashi geri strike frequency, but they are not statistically important. In examinees aged 11-12 years, the biggest contribution to karate kata performance success latent structure is through specific agility, that is, lateral mobility and gedan barai – gyaku tsuki combination realisation speed,

and through specific agility, seen as multiple direction mobility and mawashi geri strike frequency. In examinees aged 13-14 years, the biggest contribution to karate kata performance success latent structure is specific agility (Triangle movement), and specific speed (mawashi geri leg strike frequency, gedan barai – gyaku tsuki combination realisation speed). In both groups of examinees it is obvious that, besides agility, performing block strike is very important, due to its necessity for successful attack realisation. So, it is important to defend oneself, that is, not to receive a strike, because then the opponent gains advance. Further on, after a successfully blocked strike, a karate player is in advantage only if he performs a counterattack quickly, what is indicated by the importance of the variable that estimates the significance of gedan barai and hand strike gyaku tsuki block combination and mawashi geri leg strike speed.

The least influence, that did not show its karate kata performance statistic importance in any of the groups, is mawashi geri leg strike technique hip joint flexibility estimation test. Considering that the sample of examinees is in the training process for years, and flexibility can be greatly influenced by training operators, it is assumed that all the examinees, regardless of their age, are equally flexible, and so these results appeared identical in both groups. These results are expected because kate consists of very little high amplitude moves (only in mawashi geri); however, it abounds in different postures, variations of postures, turns, lunges, fist movements, swings, oversteps and similar movements.

Table 2. Regression analysis of the kata variable analysis in the area of karate players` specific motoric abilities

Variables	11-12 years (n=40)			13-14 years (n=40)		
	r	β	p	r	β	p
Side steps[#] (s)	-0.41	-0.41	0.02	-0.19	-0.20	0.26
Triangle movements[#] (s)	-0.36	-0.17	0.27	-0.44	-0.22	0.20
Block-strike[#] (s)	0.40	0.37	0.02	0.33	0.24	0.20
Gedan barai (f)	-0.23	0.09	0.58	0.02	0.32	0.08
Mawashi geri (f)	0.36	0.10	0.55	0.40	0.31	0.10
Mawashi geri (amplitude)	0.17	-0.05	0.73	0.22	-0.05	0.78
ρ		0.62	0.01		0.58	0.03
δ		0.39			0.34	

r = correlation coefficient; β = regression coefficients; ρ = multiple correlation; δ = determination coefficient; # = opposite sign variables; p = regression coefficients and multiple correlation significance

The relations of specific motoric knowledge-techniques are given in Table 3, with the karate kata performance efficiency criterion. It has to be made clear that the motoric knowledge in this case refers exclusively to the strikes performed individually or in combinations, so the information regarding the influence of certain karate strikes on kata performance success can be gained here. Multiple correlations are high and significant in both groups of boys, what means that the group of karate strikes applied is a good predictor of a karate players` kata performance success.

In boys aged 11-12 years, mawashi geri technique and gyaku tsuki -uraken combination are the best predictor of kata performance efficiency, while in boys aged 13-14 years karate strikes performed in kizame tsuki -gyaku tsuki combination are the best predictor. The correlations of almost all predictor variables (karate techniques) with a criterion (kata performance efficiency), are high and significant in the sample of younger cadets and cadets, what displays a great complexity of various kata performance efficiency in the area of specific motoric knowledge, that is, karate techniques.

Table 3. Regression analysis of kata variable in the area of karate players` technique variables

Variables	11-12 years (n=40)			13-14 years (n=40)		
	r	β	p	r	β	p
Side steps# (s)	-0.41	-0.41	0.02	-0.19	-0.20	0.26
Triangle movement# (s)	-0.36	-0.17	0.27	-0.44	-0.22	0.20
Block-strike# (s)	0.40	0.37	0.02	0.33	0.24	0.20
Gedan barai (f)	-0.23	0.09	0.58	0.02	0.32	0.08
Mawashi geri (f)	0.36	0.10	0.55	0.40	0.31	0.10
Mawashi geri (amplitude)	0.17	-0.05	0.73	0.22	-0.05	0.78
ρ		0.62	0.01		0.58	0.03
δ		0.39			0.34	0.34

r = correlation coefficient; β = regression coefficients; ρ = multiple correlation; δ = determination coefficient; # = opposite sign variables; p = regression coef. and multiple correlation significance

Conclusion

From the above we can conclude that the best kata performance success predictor in young cadets is, except for the specific agility, the speed of the gedan barai- gyaku tsuki combination (block kick) performance, while the best predictor in cadets is gedan barai blockade speed performance. Among the karate techniques (kicks) applied, the best predictor of the kata efficiency performance in young cadets is the quality of the mawashi geri and gyaku tsuki -uraken realisation, while in cadets the best success predictor is the quality of the kizame tsuki -gyaku tsuki kick performance.

It is evident that agility as a motoric ability dominates the karate sport, it interlaces through the energetic fight position movements, and fast and explosive hand swings, abundant in the karate katas. The alternate lunges, turns, swings, kicks and blockades demand a high level of a karate player`s specific motoric abilities development and technical efficiency. It is evident all the anthropological features are repeatedly connected; they intertwine and have mutual influence. The explanations should be found in the integrity of an athlete's potential and not in isolated anthropological features.

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UTJECAJ SPECIFIČNIH MOTORIČKIH SPOSOBNOSTI I ZNANJA NA IZVEDBU KARATE KATA KOD MLADIH KARATISTA

Sažetak

Cilj ovog istraživanja bio je utvrditi međusobnu determiniranost specifičnih motoričkih sposobnosti (situacijski karate testovi) i motoričkih znanja (karate tehnike) i uspjeha u izvođenju karate kata kod mlađih kadeta i kadeta u dobi od 11-12 i 13-14 godina. U tu svrhu je na uzorku od 40 mlađih kadeta i 40 kadeta primijenjen skup od 6 situacijskih motoričkih testova, te izvršeno ocjenjivanje 6 temeljnih elemenata karate tehnike. Varijablu kriterija činila je ukupna ocjena izvedbe 2 karate kate kao uspjeh u katama. Regresijska analiza je pokazala da je kod mlađih kadeta najbolji prediktor za uspjeh u izvođenju kata uz specifičnu agilnost i brzina izvođenja kombinacije gedan barai – gyaku tsuki (blok-udarac) dok je kod kadeta najbolji prediktor brzina izvođenja blokade gedan barai. Od primijenjenih karate tehnika (udaraca) najbolji prediktor efikasnosti izvedbe kata je kod mlađih kadeta kvaliteta realizacije mawashi geri i kombinacije gyaku tsuki -uraken, a kod kadeta najbolji prediktor uspjeha je kvaliteta izvođenja udarca kizame tsuki - gyaku tsuki. Evidentno je da karate sportom dominira agilnost kao motorička sposobnost koja se prožima kroz energična premještanja stavova u borbi, te brzi i eksplozivni zamasi rukama kojima obiluju karataške kate. Naizmjenični iskoraci, okreti, zamasi, udarci i blokade zahtijevaju od karatiaša visoku razinu razvijenosti kako specifičnih motoričkih sposobnosti tako i tehničke efikasnosti.

Ključne riječi*: karate, specifična motorika, tehnika, Kata, regresije.*

Marijana Čavala, PhD.
Faculty of Kinesiology
University of Split
21000 Split, Teslina 12, Croatia
Phone: +385 (0)91 834 2999
E-mail: mcavala@kifst.hr