

# Influence of the morphological characteristics and motor abilities at the performance of the left and right kata-gurume technique in Bosnia and Herzegovina judokas

Key words: judokas; morphological characteristics; motor abilities; kata-guruma.

Ključne riječi: džudisti, morfološke karakteristike, motoričke sposobnosti, kata-guruma.

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## Abstract

Main goal of this research is to determine the influence of the morphological characteristics and motor abilities at the performance of the left and right kata gurume in Bosnia and Herzegovina judokas. Research was conducted in 2008 under the auspices of the Judo association of B&H, during summer training camps in Neum and Trebinje. Sample consisted of 87 judokas, senior and junior age and included all of the seven weight categories. The determination of the morphological characteristics and motor abilities influence at the performance of the kata gurume was done by the use of the regression analysis. Results bring us to the conclusion that the situational efficiency in not only under the influence of the morphological characteristics, body weight precisely but is influenced also by the explosive strength. To conclude, regression analysis paints us a real existing picture which shows that the fundamental ability for the successful and efficient performance of left and right kata –gurume is explosive strength.

## Sažetak

Cilj ovog istraživanja bio je da se kod džudaša utvrde utjecaji morfoloških karakteristika i motoričkih sposobnosti na izvođenje tehnike kata-guruma u lijevu i desnu stranu kod džudista u BiH. Istraživanje je sprovedeno u 2008 godine pod okriljem džudo saveza Bosne i Hercegovine, na ljetnim kampovima koji su održani u Neumu i Trebinju. Obuhvatilo je 87 džudasa seniora i juniora u svih sedam težinskih kategorija. Za utvrđivanje utjecaja morfoloških karakteristika i motoričkih sposobnosti na izvođenje tehnike kata-gurume vršeno je regresijskom analizom. Rezultati istraživanja nam daju zaključak da uticaj morfološke karakteristike, tačnije mase tjela dokazuje da situaciona efikasnost ne zavisi samo od mase tjela, nego od eksplozivne snage koja ima veliki utjecaj na izvođenje kata guruma u desnu i lijevu stranu. Dakle regresionom analizom smo dobili stvarnu sliku a to je da je za uspješno i efikasno izvođenje kata gurume u desnu i lijevu stranu, jedna od fundamentalnih sposobnosti eksplozivna snaga

## Introduction

Based at previous research of the morphological characteristics and motor abilities influences in judo, there should be enough information that give us complete insight at the structure and domination of certain anthropometric characteristics during judo match. Success formula in judo at the time being represents just the hypothetically set hierarchic structure of the abilities, characteristics and judokas knowledge, important in high sport result achievements. Based at structural and biomechanical judo analysis confirmed by the previous investigations (Sertić & Vuleta, 1997., Bratić, 1998., Banović, 2001., Takeuchi at al. 1999.; Kajmović at al.2007.; Kajmović at al.2008.; Franchini at al. 2001.b.; Monteiro at al. 2001.; Takeuchi at al. 1999.), it can be presumed that three motor-functional abilities are presudne for success in judo – strength, coordination and aerobic – anaerobic endurance. Each strength type (maximal, repetitive, explosive and static) is applied during the match, making stronger judokas more superior than their counterpart, in a case of the same level of technical knowledge.

Therefore the influence of the strength at the success in judo has not been yet determined completely. Judo match can be considered as an out minding of two judokas. Applied method and work load influence at morphological characteristics of judokas. It is desirable to have as much as of muscle mass in total body

weight. Excess subcutaneous tissue means larger body weight, which leads to higher weight category, which usually means less chance for the success at the competition (Sertić, 2004).

For the learning and execution of the complex technical – tactical elements, and adjusts to specific judo match conditions, it is necessary to have outstanding developed coordination abilities (Rađo & Kajmović, 2001). Judokas speed is of most importance considering that it is necessary to take by surprise the opponent with quick reaction, weather during the attack or defense. In contraire the opponent has time to “read” visualized action and make a counterattack. Aim of the paper id to determine the influence of the morphological characteristics and motor abilities at the performance of the hand judo technique KATA – GURUMA to the left or to the right in Bosnia and Herzegovina judokas.

## Method

### Sample of the examines

Sample of the examinees consisted of 87 male judokas form B&H, aged 18-30 with at least five years of experience in judo, divided in to all of the seven weight categories. Judokas were healthy without any morphological and locomotors aberrations. Only criterion was the five year long period of judo training.

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### Sample of the variables

Research conducted at the sample of judokas comprehends the testing and measurement inside three anthropological sections:

Morphological characteristics  
Motor abilities  
Situational performance of the left and right Kata-Guruma technique

### Variables for the assessment of the morphological characteristics and motor abilities

#### Predictor variables for the assessment of the morphological characteristics:

Body height (AVIS)  
Body weight (MASTJL)

#### Predictor variables for the assessment of the motor abilities:

Flexibility test  
Toe Touching (MFLPRK)  
Shoulder Flexibility (MFLISK)  
Standing Front split (MFLPRR)

Explosive strength tests  
Vertical jump (MFESVM)  
Broad jump (MFESDM)  
20 m Sprint (MFE20V)

Coordination tests  
Bat Coordination (MKTOSP)  
Air coordination (MKTOZ)  
Ground coordination (MAGONT)  
Letter run test (MAGTUP)

### Grading criterion for the left and right kata-guruma technique

Experimental performance of technique, was graded by the five grades scale (Bratic 1998), general differentiating criterion was the following:

**Grade 5 (five)** timely performed attack and entrance in to the opponent, good contact, well disturbed balance, coordinated foot and arm work, controlled performance of technique, in rhythm and tempo, safely and efficient, precise.

**Grade 4 (four)** excellent performance of judo technique but somewhat disturbed above mentioned components.

**Grade 3 (three)** good performance of the judo technique, minor mistakes, but generally, movement structure does not change, performance is still stabile.

**Grade 2 (Two)** very good performance of the technique, with minor mistakes, movement structure does not change, performance is not completely stabile.

**Grade 1 (one)** bad quality performance, major deficiencies, movement structure significantly changed, element performance is not satisfactory.

### Data analysis method

For the determination of the predictor variables we used regression analysis method.

## Results and Discussion

### Regression analysis of the criterion variable Right Kata-Guruma

Regression analysis of the criterion variable Right Kata-Guruma gives us information on the level of the morphological and motor abilities influence at the technique performance. With this space of morphological characteristics and motor abilities 45 % of joint variability is explained with criterion variable defining the level of technique performance.

Multiple correlation coefficients R have high statistical value (.72), at the ( $p < .000$ ).level of significance.

Analyzing the table with individual influences of the variables for the assessment of the morphological characteristics and motor abilities at the kata guruma technique, it is evident that at the level of the statistically significant partial influences at criterion have explosive strength and body weight.

Derivation of the variables at the first main component gave us 4 variables responsible for the performance of the right kata gurume.

Analyzing the influence of the individual morphological characteristics and motor abilities, it can be seen that most statistically significant influence at criterion variable have AMAS – body weight, MFESVM – vertical jump, MFESDM – broad jump, MFE20V – 20 m sprint standing start, significant at the  $p-.01$  to  $p-.05$  level.

This lead us to the conclusion that the influence of the morphological characteristics, body weight precisely proves that the situational efficiency is not only dependable on body weight but also on explosive strength which has a great influence at the right kata gurume.

Regression analysis paints us a real existing picture which shows that the fundamental ability for the successful and efficient performance of right kata –gurume is explosive strength.

At the partial level variables comprising predictor system and partially explain and efficiency of the right kata gurume performance are body weight and explosive strength. Question arise: why coordination and flexibility variables are not statistically significant in predicting situational efficiency of the right kata gurume? The answer is in sample of the examinees. Examinees are top level judokas, and they have high level of the technique quality, and technique represents coordination. Their technical performance does not depend on conscious level of the central nervous system. They have dynamic stereotypes of the technique performance at the lower structures of the central nervous system functioning at subconscious level. That is the probably the reason why we did not get the variable of the coordination as predictive values. Obtained data have their logic, as judo is explosive sport, at top level by body mass and explosiveness and not by coordination and flexibility. That confirm variables derived. Derived variables of body weight and explosive strength confirmed themselves through previous investigations and comply with the theory of judo as sport with explosive characteristics.

$R = ,72475124$ ;  $R = ,52526436$

Adjusted  $R = ,44828020$

$F(12, 74) = 6,8230$

$p < ,00000$

Std. Error of estimate: 74278

**Table 1.** Regression analysis of the criterion variable Right Kata-Guruma

		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(74)	p-level
Intercept			6,14	3,93	1,56	,12
AVIS	,03	,12	,00	,02	,30	,75
AMAS	,31	,12	,02	,00	2,61	,01
MFLPRK	-,10	,10	-,01	,01	-1,00	,31
MFLISK	-,00	,09	-,00	,00	-,04	,96
MFLPRR	,04	,09	,00	,01	,42	,67
MFESVM	-,37	,10	-2,88	,81	-3,54	,00
MFESDM	,39	,12	2,24	,69	3,23	,00
MFE20V	-,24	,12	-1,02	,50	-2,01	,04
MKTOSP	-,16	,10	-,13	,09	-1,51	,13
MKTOZ	-,08	,10	-,16	,19	-,84	,39
MAGONT	-,05	,10	-,04	,08	-,57	,56
MAGTUP	-,08	,10	-,07	,09	-,74	,45

**Regression analysis of the criterion variable left Kata-Guruma**

Regression analysis of the criterion variable Left Kata-Guruma gives us information on the level of the morphological and motor abilities influence at the technique performance. With this space of morphological characteristics and motor abilities 37 % of joint variability is explained with criterion variable defining the level of technique performance.

Multiple correlation coefficients R have high statistical value (.68), at the (p < .000).level of significance.

Analyzing the table with individual influences of the variables for the assessment of the morphological characteristics and motor abilities at the kata guruma technique, it is evident that at the level of the statistically significant partial influences at criterion have explosive strength and body weight.

Analyzing the influence of the individual morphological characteristics and motor abilities, it can be seen that most statistically significant influence at criterion variable have AMAS – body weight, MFESVM – vertical jump, MFESDM – broad jump, significant at the p-.01 to p-.05 level.

This lead us to the conclusion that the influence of the morphological characteristics, body weight precisely proves that the situational efficiency is not only dependable on body weight but also on explosive strength which has a great influence at the left kata gurume.

Regression analysis paints us a real existing picture which shows that the fundamental ability for the successful and efficient performance of left kata –gurume is explosive strength.

Based at the motor aspects we gained a similar situation as in right kata gurume performance. Again statistically significant variables are body mass and explosive strength, while no statistical significance have coordination variables. From motor view in realization are involved same motor mechanisms necessary for the realization of the kata –gurume at top level. It clearly shows that the judokas mastered motor act and that main role in realization have explosive capacities supported by body mass not by coordination.

R = , 67910451; R = , 46118293  
 Adjusted R = , 37380719  
 F (12, 74) = 5, 2782  
 p < , 00000  
 Std. Error of estimate: 79132

**Table 2.** Regression analysis of the criterion variable Kata-Gurume to the left

		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(74)	p-level
Intercept			4,06	4,19	,96	,33
AVIS	-,08	,13	-,01	,02	-,63	,52
AMAS	,32	,12	,02	,00	2,53	,01
MFLPRK	-,11	,11	-,02	,02	-1,05	,29
MFLISK	-,03	,09	-,00	,00	-,32	,74
MFLPRR	,08	,10	,00	,01	,80	,42
MFESVM	-,33	,11	-2,54	,86	-2,94	,00
MFESDM	,50	,12	2,87	,73	3,89	,00
MFE20V	-,07	,13	-,30	,53	-,56	,57
MKTOSP	-,08	,11	-,07	,09	-,79	,43
MKTOZ	-,21	,11	-,38	,20	-1,91	,05
MAGONT	-,02	,10	-,019	,09	-,20	,83
MAGTUP	-,02	,11	-,026	,10	-,25	,79

## Conclusion

Analyzing the results of the criterion variables of the right kata gurume it is evident that at the level of the statistically significant partial influences at the criterion have explosive strength and body mass variables. Four variables responsible for the performance of the right kata gurume are AMAS – body weight, MFESVM – vertical jump, MFESDM – broad jump, MFE20V – 20 m sprint standing start. Analysis of the regression analysis of criterion variable left kata gurume show three variables responsible for its performance: AMAS – body weight, MFESVM – vertical jump, MFESDM – broad jump. This leads us to conclusion that morphological characteristics, body mass precisely influence situational efficiency of the right and left kata gurume, while motor ability of explosive strength has fundamental, large influence at the technique performance of the treated sample, of the top level judokas in Bosnia and Herzegovina.

It can be concluded that there is a lot of space in mastering of this technique in competition which will result with the more quality results in B&H judokas.

Analyzing the investigation it is clear that the top level judokas in B&H have situational performance of kata gurume technique determined by body mass and explosiveness. This fact does not put flexibility and coordination variables at the low level, in fact, technical movements become automatic and at the top level of performance. It is also noticeable that better performed is right technique, while left side technique is significantly weaker. The reasons for this state can be found in training process and training technology of the judokas at their clubs.

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