

## DEVELOPMENT OF BODY MOBILITY IN KARATE PRACTICES (CADETS AND JUNIORS)

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### Abstract

**Objective.** The purpose of this study is to highlight some of the methods for the correct development of body mobility for karate training in order to achieve sports performance.

**Methods.** Since the concept of mobility is not applied methodically in karate, and the stretching principles are practically unknown, I have presented in this paper a compendium of exercises that contribute to the development of mobility and a karate- shotokan application program, starting from methodical and anatomical principles on the basis of basic training in athletics and gymnastics.

The research was carried out in two stages: the first stage was to determine the individual level of body mobility of the subjects and the second stage to be carried out for eight months and to evaluate the final progress achieved after observing the training method I proposed to develop the mobility of karate- shotokan practitioners.

**Results.** In order to ascertain whether the progress made by the experimental group is significant, trustworthy and that they are not due to chance, but to our intended action, we calculated the statistical index "t" (STUDENT test).

The differences in the value of the results obtained between the averages of the two tests  $T_i$  (initial test) and  $T_f$  (final test) are significant, certainly 95%.

**Conclusions.** Considering the fact that after the final testing a good homogeneity of the team can be ascertained as well as an important increase of the statistical indices, we can conclude that the actuation systems applied in the experiment were well selected.

It is very important to ensure through a logical and well-thought-out training the development of all the elements that contribute to the sporting form of a karate- ka including mobility.

**Keywords:** development; mobility; karate; training.

### Introduction

Karate is part of the Martial Arts family being the most popular art practiced in the world (Zurakowski et. al., 2005).

Karate literally translated means "empty hand" and is derived from a martial art developed in Okinawa, Japan, in the early 17th century, even after the Japanese conquered this island and banned the use of all weapons. After World War II, karate has spread around the world and is currently one of the most attractive combat sports, a fact confirmed by millions of people practicing karate worldwide. There are many styles of karate, but only four are recognized by the World Karate Federation (WKF): Goju, Shito, Shotokan and Wado. Each of them pursues specific ideas, which lead to variations in techniques (Chaabene & Hachana, et. al., 2012).

This sport distinguishes two competitive disciplines: kata and kumite. Kata represents

preconceived sequences of offensive and defensive techniques, that represent real battles against fictional opponents, and kumite represents a real match against an opponent, in which the two competitors, according to strict rules and limited area, are free to move, defend and attack with different body segments (Mirmoezzi & Sadeghi, et. al., 2018). The Kumite is also characterized by rapid accelerations and decelerations during combat, which require a high capacity of power, speed and strength (Trancoso, 2019; Herrera-Valenzuela, & Miccono-González, et. al., 2020).

One of the basic motor qualities that influences the execution of karate techniques is mobility. Amălinei, (2006) stated that mobility is one of the most important characteristics of the human body, especially since compared to the other motor qualities, mobility is the most difficult to maintain over time, disappears most quickly during periods

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of rest and is the most aggressive form of training of muscles and joints, because these components begin to get results when pain occurs. However, mobility must be worked dosed over a long period of time and only after intense heating.

Piscoi, (2014) stated that a concrete method of gymnastics, applied in other sports, for the development of joint mobility is stretching. Stretching is not a new concept. It has always been described in literature and art, across the globe. In English it means elongation, the action to expand, stretch something, which implicitly implies elasticity (Jessica, 2016; Jessica, 2021).

In the Romanian language the term has not entered the DEX, being used in the Romanian language with reference to a certain type of physical exercise by which the stretching of the muscles is carried out and the mobility of the body is increased.

**Methods**

The research aims to contribute to the development of the mobility of cadets and juniors, shotokan karate practitioners, by applying the

STRETCHING method and methodically staggered, carefully selected.

The investigation took place over the course of six months at the gymnasium of the Marshal Alexandru Averescu - Adjud/ jud. Vrancea. The selected subjects to research are fifteen, beginners, athletes legitimized at the "Kazumi Sports Club" - Focșani - Vrancea (Shotokan karate section).

The initial testing of the subjects took place at the gym of the Averescu-Adjud School and was tasked with identifying the individual level of mobility development.

The majors used in the research were: DSLR canon EOS 850D camera, 24.1 MP, 4K, Wi-Fi, black, Objective 18-55mm EF-S, metric band(roller), goniometer.

Control tests:

1. For dynamic mobility



Figure 1. Dynamic flexibility

1. For dynamic flexibility  
 Bringing the right foot forward-up  
 P.I. – Stand apart with your right arm forward ...



Figure 2. Carrying the foot forward

... the right leg is extended forward (maximum forward-up).

Mobility was measured for the other leg.



**Figure 3. Carrying the lateral leg**

Carrying the lateral leg:

P.I. – Stand with close legs, left arm sideways...



**Figure 4. Carrying the lateral leg**

... the left leg is carried through the upper side.

Observations:

- mobility measurement was done for both legs;
- that the vertical for measuring mobility has been taken the support leg which must be perfectly stretched;
- mobility for these exercises was measured in degrees by means of a compass.

## 2. For mobility of the coxofemoral joint



**Figure 5. Execution of the lateral string**

Execution of the lateral string

Move your legs as far apart as possible, the arms rest forward on the ground, the torso tilts slightly forward, and the soles are parallel



**Figure 6. Execution of the lateral string with the toes up.**

Execution of the lateral string with the toes up.

Move your legs as far to the side as possible, the arms rest forward on the ground, the torso tilts slightly forward, and the tips of the legs are facing upwards.

### 3. Execution of the string before



**Figure 7. Run the string forward.**

Run the string forward.

The basin is slightly designed forward, and the body rests on the hands

Note: for the lateral string and before the mobility was measured in centimeters using a metric band (the distance between the pubis and the ground was measured).

### 4. Execution of the bridge



**Figure 8. Execution of the bridge**

From the dorsal lying position vigorously push the pelvis upwards (palms and feet are in contact with the ground all over the surface)

Note: The distance between the hands and heels was measured using a metric band.

Exercises applied in the experiment:

1. Actuating systems for the development of dynamic mobility.  
Stretching

2. Actuation systems for the development of mobility in the joint coxo-femoral;

3. Preparatory drive systems for lateral string;



4. Actuating systems for the execution of lateral twine;
5. Preparatory actuators for the lateral rope executed with the tips of the facing upwards;
6. Preparatory actuators for the front;
7. Actuating systems for the execution of the forward string;

The second part of the research took place in the same gym, applying for six months the stretching method to develop of body mobility. The actuators for the development of mobility were applied after specific karate training, when the athletes had very well warmed body muscles. During these six months the cadets and juniors had three workouts a week, the duration of preparation for the development of body mobility being 35 minutes.

At the end of the six months, the cadets and juniors were subjected to final testing.

This final stage of the research was to assess the final progress reached after the application of the stretching method that was proposed for the development of body mobility of cadets and juniors practicing Shotokan karate. The same control samples were used as in the case of the initial test.

### Results

In order to be able to carry out an analysis of the success of the experiment, the collected data were statistically processed, the values being presented in Tables 1 and 2.

**Table 1.** Dynamic mobility statistical work, Side rope

Statistical indices	Dynamic mobility				Side rope			
	Bringing the maximum foot forward (degrees)		Carrying the maximum lateral foot (degrees)		Made with parallel soles (cm)		Performed with the tips of the legs up (cm)	
Testing	T0	T1	T0	Tf	T0	T1	T0	Tf
x	119,33	156,8	117,73	158,8	42,333	18,2	40,467	21,933
S	20,12	5,44	50,12	5,44	18,291	10,423	5,5635	6,4226
CV (%)	16,8	3,46	17,9	3,42	50,95	50,93	21,5	33,15
t	6,88		7,63		3,98		6,34	

**Table 2.** Statistical work: String forward, Bridge execution in gymnastics

Statistical indices	String forward		Bridge execution in gymnastics	
	T0	Tf	T0	Tf
x	39,467	17,733	75,73	44,93
S	5,8101	5,3971	25,97	12,41
CV (%)	16,8	34,79	34,29	27,62
t	9,32		4,14	

The following statistical indices were used in this investigative approach: arithmetic mean, standard deviation, variability coefficient and student test. After the initial test, there was a lack of homogeneity of the experimental group, the scattering of the results being large. In terms of lack of homogeneity, we can say that it is caused by the different level of development of the mobility of the of the cadets and juniors body.

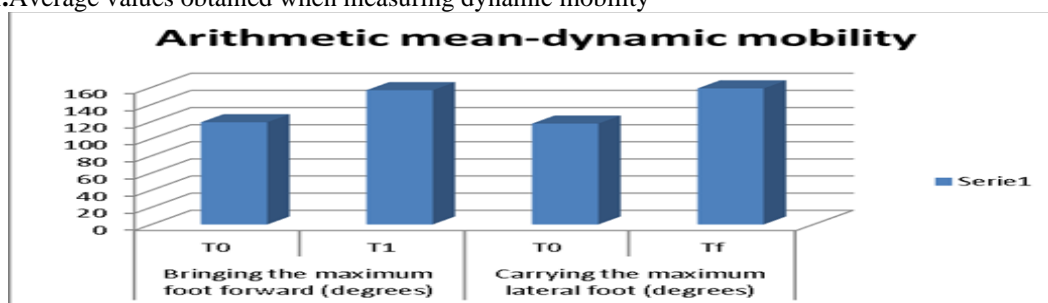
After applying the proposed training method during the six months of training, at the end of this

period, the final testing was carried out thus assessing the final progress in the development of body mobility.

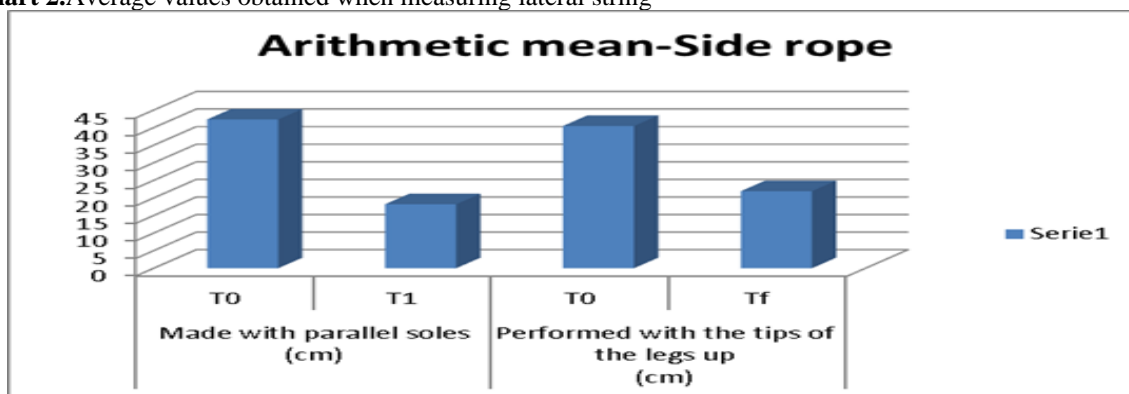
To make a comparative study between the initial and the final testing we made a parallel between the initial and final arithmetic mean corresponding to each sample.

These comparative analyses are accompanied by the following graphs:

**Chart 1.** Average values obtained when measuring dynamic mobility



**Chart 2.** Average values obtained when measuring lateral string



From the analysis of these graphs it appears that the experimental group has a higher level of development of body flexibility compared to that initially found.

In order to be sure that the evolution of the cadets and juniors subjected to the experiment is significant, trustworthy and that it is not due to chance, but to our intentional action, the statistical index "t" (student test) was calculated.

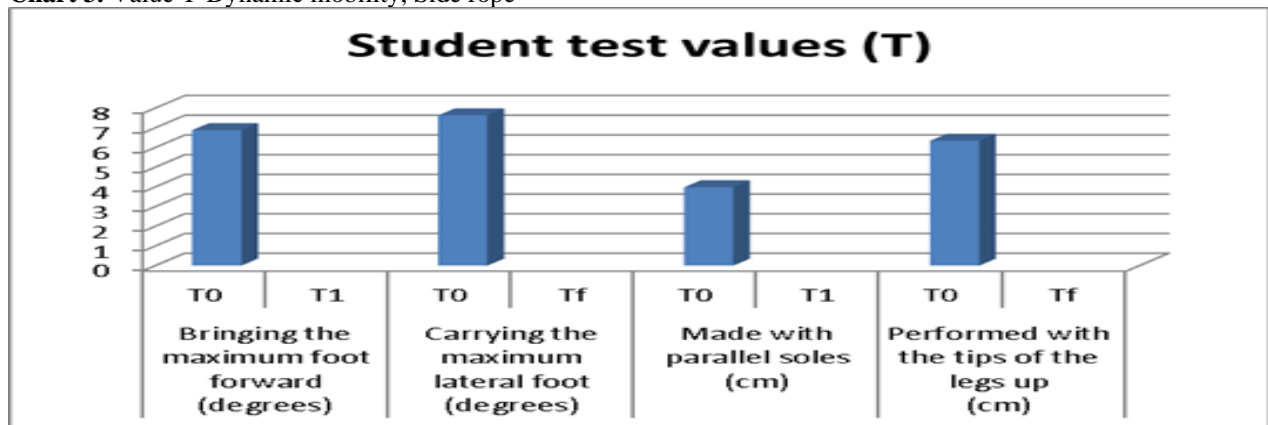
The risk we take in our assessment is given by the threshold of significance, which in our field of

activity, the most lenient is 95% ( $p=0.05$ ). The values of the test "t" (calculated) are compared with the values of "t" corresponding (theoretical) to the number of cases processed in column  $f=n-1$  (degrees of freedom) contained in the special tables (FISCHER'S TABELA).

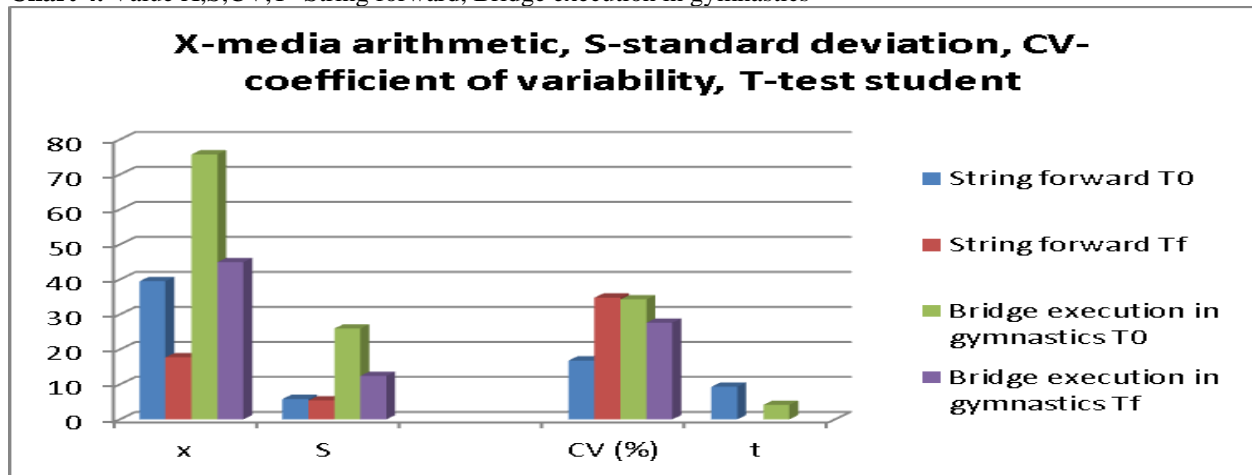
Thus, in our case, the value of "t" in the table at 95% accuracy is as follows:

$$F = 15 - 1 = 14 \text{ (degrees of freedom); } t = 2,145$$

**Chart 3.** Value T-Dynamic mobility, Side rope



**Chart 4.** Value X,S,CV,T- String forward, Bridge execution in gymnastics



The calculated value of the "t" test for each sample is greater than its theoretical value in the table.

Finally, the differences in the value of the results obtained between the averages of the two To (initial testing) and Tf (final testing) are significant, certainly 95%.

#### Acknowledgments

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#### Conclusions

Final tests show us a good homogeneity of the collective but also an important increase in statistical indices, which leads us to conclude that the action systems applied, in this investigative approach, have been well selected.

Mobility is of an absolutely necessary quality for practicing the discipline shotokan karate it. It implies, from the beginning, increasing the amplitude of movements in the arms and legs which leads to a better use of strength and speed. Mobility is a quality that can be improved after training.

In order to progress any karate do practitioner must understand that the basis of the methods of developing the mobility of the body lie a number of physical, physiological and biomechanical laws. The development of body mobility in martial arts practitioners is not done at random. The movements performed are subject to anatomically determined laws of motion, are functional and succeed in a methodical sequence.

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