

DEVELOPMENT OF STATIC-ACTIVE FLEXIBILITY SPECIFIC TO SHOTOKAN KARATE FOOT TECHNIQUES

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Abstract

Flexibility is an essential quality for an athlete, which is why a high level of flexibility is required to increase efficiency and economy of movement, which interests all sports disciplines.

The purpose of this scientific approach is to show that the development of static flexibility specific to foot techniques in karate, for practitioners between the ages of 14 and 18, is not done at random. The drive systems, applied within the programme proposed in this study for the development of flexibility, are subject to anatomically determined laws of motion, are functional and succeed in a methodical sequence.

The experiment performed on karate practitioners - shotokan emphasizes the importance of developing specific mobility which will allow them to execute foot techniques at a higher level and achieve outstanding performance.

The application of the tests and the implementation of carefully selected drive systems that contribute to the development of mobility specific to karate techniques substantiates the working hypothesis and validates through its results the correctness of the experimental operation.

Keywords: flexibility, development, technique, karate.

1. Introduction

Researchers Felix, J.M. R., & Ashwin, P. (2014) argued that martial arts are coded combat systems and traditions, which are practiced for several reasons: self-defense, competition, physical health and fitness, entertainment, as well as mental, physical and spiritual.

"Martial arts, as the core of all combat styles, have tradition, principles and special philosophies (zen, Buddhism, Daoism, etc.) through which they differ clearly from other forms of combat".*

Master Deshimaru Taisen said that "The true kinship between martial arts and Zen lies in the fact that both can lead us to the spirit of the path: because any conflict, whether it takes place inside the body and mind or outside them, is always a battle against the self." †

According to the theory of the Belarusian group of authors, Petrov, L, et al., (2018), Karate is one of the most popular sports martial arts, practiced all over the world and its best known styles

* Deliu, D. (2008). Method of combat sports disciplines. Bren Publishing. Bucharest .p. 12

† Deshimaru, T. (1982). Zen and martial arts. Herald Publishing. Bucharest. p.5

are Shotokan, Shitoryu, Goju-ryu, Wado-ryu and Kyokushin. Karate includes two competitive disciplines: kumite and kata.

Karate, which means "empty hand", was developed in Okinawa in the early 17th century (modern karate) after the Japanese conquered the island and banned the use of all weapons. Today, millions of people practice karate all over the world (Felix, J.M. R., & Ashwin, P-2014).

"Karate do is a martial art in which the ultimate goal is not to seek to win a battle, but to work to improve character, personality, through accumulation of experience, through specific training." ‡

"Karate begins and ends with courtesy!" - Gigin Funakoshi (1868-1957) the father of karate. §

With the popularization of Karate, methods to develop body mobility have evolved. In this evolution a decisive role was played by the training of European, American and Canadian specialists, who adopted the Japanese methods of working with the body and deciphered the mechanisms of carrying out these exercises.

"Mobility is the ability of man to make the most of the anatomical potential of locomotion in a particular joint or in all the joints of the body, concreted by performing movements with high amplitude"*** therefore a high level of flexibility is required to increase the efficiency, effectiveness and economy of movement, which is generally true in all sports. The practice of Martial Arts requires a special development of mobility, primarily for the correct execution of basic techniques.

"Flexibility is defined by stretching experts as "the absolute degree of movement in a joint reached by a short-term effort, with the help of a partner or using specific equipment"††

This definition emphasizes that flexibility is not general in nature, it is specific to a joint or a set of joints. For example, a person who has flexible upper body is not necessarily flexible in the lower body.

In this study we focused on the development of static-active flexibility, which the researcher Neculai Acalina defines, in his work Practical Course of Karate Do-2006, as the ability to execute and maintain body positions in extension, using only the tension of agonists and synergists muscles while antagonistic muscles are more stretched. Lifting a leg and keeping it without support is an example of this (Neculai Amalina 2006).

‡ Deliu, D. (2008). Method of combat sports disciplines. Bren Publishing. Bucharest .p. 122

§ Gigin Funakoshi. (1998). Karate-do Myway in life. Garell Publishing House. p. 144

*** Nicu, A., et al. (1993). Modern sports training. Editis Publishing. Bucharest

†† Tony Gummerson, *Mobility Training for the Martial Arts*, A&C Black Publishers. 1990

Through this research we want to contribute to the development of the flexibility of the body of Shotokan karate practitioners, who are between 14-18 years old, by applying the STRETCHING method and methodically staggered drive systems, carefully selected against the background of a basic training in gymnastics.

Since the concept of flexibility is not applied methodically in martial arts, and the principles of scientific stretching are virtually unknown, we presented in this approach a compendium of exercises (action systems), which contribute to the development of mobility and a stretching program applicable in Karate Do.

Using the stretching method, it can improve muscle flexibility and elasticity for Karate Do practitioners, who are between 14 and 18 years old, which will allow them to perform the techniques specific to this discipline at a higher level and achieve outstanding sports performance.

2. Materials and methods

The experimental research took place over a period of eight months at the gymnasium of the Theoretical High School "Ioan Slavici"-Panciu, jud. Vrancea.

The subjects of the research are fifteen practitioners of Shotokan Karate Do and are between the ages of 14 and 18. They are the students of the "Theoretical High School - Ioan Slavici" Panciu, jud. Vrancea and members of the "Kazumi Sports Club" -Focsani-Vrancea Association (Shotokan karate section).

The first stage of the research consisted of the initial testing of the subjects, which took place in the gymnasium where the Kazumi-Focsani Sports Club Association is training.

This first stage was aimed at detecting the individual level of development of the mobility of the body of the students participating in the extracurricular activities entitled "KARATE-DISCIPLINA AND EDUCATION".

The following devices and materials were used in the research: NIKON camera, metric tape (roller), goniometer, trellis.

Control samples

A. For active static flexibility



Figure 1. Technique by Mae Geri

P.I. – sitting (Hachiji – Dachi) goes the outstretched leg forward executing the Mae Geri technique (direct kick forward) and keeps the leg stretched as far as possible (the torso is straight). It runs the technique with the other leg.



Figure 2. Technique by Yoko Geri

P.I. – sitting (Hachiji – Dachi) goes the foot to the side performing the Yoko Geri Keromi technique (kick to the side after a direct trajectory) and keeps the leg extended as far as possible. It runs the technique with the other leg.



Figure 3. Technique by Mawashi Geri

P.I. – sitting (Hachiji – Dachi) goes semicircular leg executing the Technique Mawashi Geri (kick after a circular trajectory) and keep the leg extended as much as possible (the torso is straight, arms bent at chest level). It runs the technique with the other leg.



Figure 4. Technique by Ushiro Geri

P.I. – sitting (Hachiji – Dachi) goes back foot performing the technique with Ushiro Geri (direct kick back) and keep the leg stretched as far as possible.

It runs the technique with the other leg.

Note: for figures 5-8, the time to maintain the techniques was timed.

B.Actuating systems applied in the experiment

I. Exercises for the development of flexibility

1. Examples of exercises for the development of dynamic flexibility
2. Examples of exercises for the development of static flexibility

II.Stretching

1. Exercises to develop the degree of mobility in the joint coxo-femoral

III. Execution of side string

1. Preparatory exercises for lateral rope
2. Exercises for the execution of lateral string
- 3.Preparatory exercises for lateral rope executed with toes facing upwards

IV. Execution of the string before

1. Preparatory exercises for the rope before
2. Exercises for the execution of the string before

V. Mobility exercises specific to karate techniques

1. Specific flexibility exercises for Mae Geri
2. Specific flexibility exercises for Yoko Geri
3. Specific flexibility exercises for Ushiro Geri
4. Specific flexibility exercises for Mawashi Geri.

The second phase of the research took place in the same gym over a longer period of time, i.e. eight months (September – April inclusive).

Exercises to develop body flexibility were performed at the end of each extracurricular activity, after the muscles were well warmed. During this period, four activities were carried out per week, and the duration of the session for the development of body flexibility was between 20 and 30 minutes. During this time the subjects were subjected to the training method that I proposed in this paper.

At the end of the preparation period, i.e. at the end of the eight months, the experimental group was subjected to final testing.

This last stage of the research was to evaluate the final progress reached after observing the training method that we proposed for the development of the flexibility of the body of the practitioners of the Shotokan Karate Do discipline.

The same control samples used in the initial testing framework were used. Measurements carried out at this last stage of the research have been entered in the registration sheets.

3.Results

In order to assess the success of the experiment, we statistically processed the collected data, the values obtained being presented in Table 1.

Table 1. Statistical processing of the collected data and the values obtained

Statistical indices	Flexibility statical-active							
	Bringing the foot forward mae geri (s)		Carrying the lateral leg yoko geri kekomi		Leading the foot forward after a circular trajectory mawashi geri (s)		Bringing the leg back ushiro geri (s)	
	T0	T1	T0	Tf	T0	T1	T0	Tf
x	35,6	70,88	34,6	66,88	37,6	68,88	31,6	62,88
S±	11,49	5,06	11,49	5,06	11,49	5,06	11,49	5,06
CV(%)	32,28	7,14	33,21	7,56	30,56	7,34	36,37	8,04
t	10,88		9,95		9,64		9,64	

In research we used the following statistical indices: arithmetic mean, standard deviation, variability coefficient and STUDENT test. Following the initial test, a lack of homogeneity of the experimental group could be found, the scattering of the results being large. The lack of homogeneity is caused by the different level of development of the mobility of the practitioners' body.

After observing the training method that we proposed during the eight months of training, at the end of this period, the final testing was carried out, thus evaluating the final progress in the development of the mobility (flexibility) of the body.

In order to conduct a comparative analysis between the initial and final testing, we made a parallel between the initial and final arithmetic averages corresponding to each sample.

These parallels are accompanied by the graphic:

Chart No.2 Arithmetic Mean
 Mae Geri and Yoko Geri

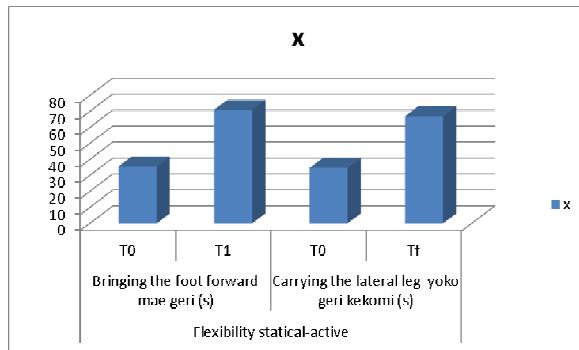
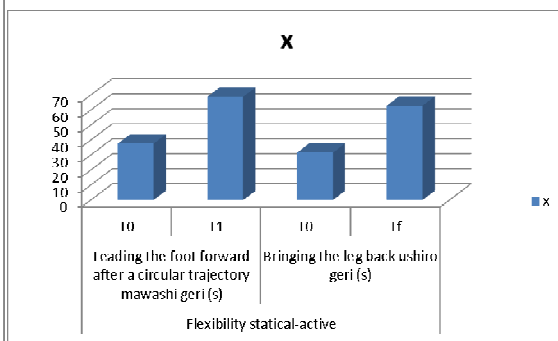


Chart No.3 Arithmetic Mean
 Mawashi Geri and Ushiro Geri



From the study of these graphs it can be found that the experimental group has a higher level of development of body flexibility compared to that originally found.

To find out if the progress made by the experimental group is significant, trustworthy and that it is not due to chance, but to our intentional action, we calculated the statistical index "t" (student test).

The risk we take in our assessment is given by the threshold of significance, which in our field of activity, the most permissive 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 TABLA).

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 No. 4 Student Test Value (t)

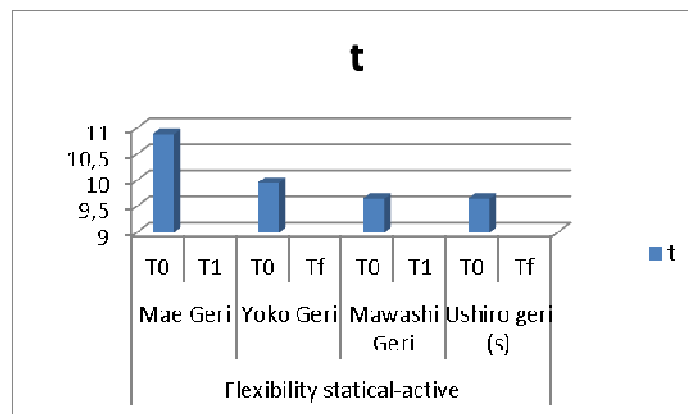
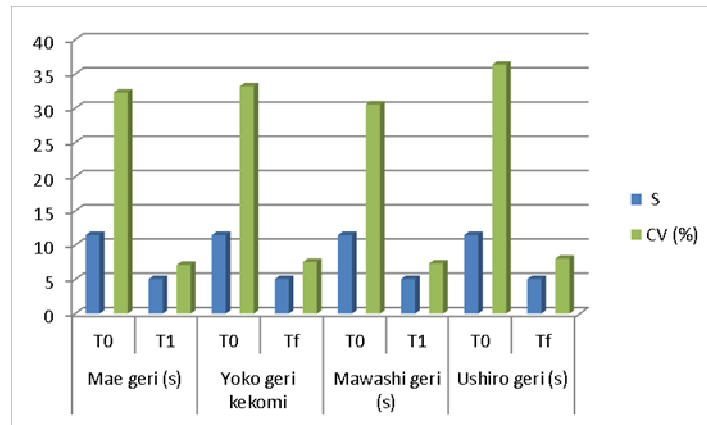


Chart No. 5 Standard deviation and variance coefficient S (\pm), CV (%)



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%.

Conclusions

Given that the final test can show a good homogeneity of the collective as well as a significant increase in the statistical indices we can conclude that the actuators applied in the experiment were well selected

Increasing the amplitude of movements can be achieved with the help of flexibility exercises that will be performed with (or without) helpful objects. Choosing inappropriate exercises, an unfavourable time of stretching during training, and choosing the wrong method of performing can considerably hinder the development of mobility. Therefore, these exercises must be well selected and structured methodically to avoid injury, mistakes and lack of results.

Recommendations

In assessing the flexibility of the body we recommend the transition from classical measurement methods, which do not have a very high degree of precision, to emerging technologies (state-of-the-art measuring and evaluation devices, software, etc.) that are more accurate and with a much lower degree of error.

We propose that in the KARATE DOJOs (training rooms), ensure through a logical and well thought-out training, the development of all the elements that contribute to a sporty form of a KARATE-KA including flexibility.

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