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Correlation between Plantar Pressure and Striking Speed in Karate-do

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Abstract

The present paper focuses on a topic that represents a permanent concern for the authors. The correlation between plantar pressure and execution speed in Karate-do is a major issue for achieving competition objectives. A correlation was established between maximal pressure values (on the left and right feet - the correct stance) and execution speed while performing the strikes specific to Karate-do. We found that the correlation coefficients achieved high to very high values, which proves that the striking speed is strongly influenced by maximal pressure (the correct stance) on each foot. At the same time, we noticed that all the correlation coefficients had positive values, which means that any of the couples of variables we have considered acts in the same direction. Therefore, if one of the variables is on a descending trend, the other will also be on a descending trend, while if a variable is on an ascending trend, the other will also be on an ascending trend.

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1. Introduction

The increase in the number of participants and the improvement of sports performances in the Karate-do field have intensified the preoccupations related to the sports training approach from strictly scientific perspectives (Amălinei, 1998; Martin, 2007; Crof, 2001). That is why our enterprise wasn't easy at all: we started developing a study that allowed us to configure the main technical elements extracted from both the specialty literature and the discussions with some technicians and athletes. In this sense, we considered it would be important for us to analyze the studies issued by a series of specialists in the field, but, at the same time, to start a research based on our own previous studies and on our permanent concern with all the Karate-do aspects, among which those related to its specific technique (Petre, 2011). Thus, we initiated a research on the plantar pressure, respectively on the way in which it influences the execution speed while performing the strikes specific to the domain.

2. Research design

2.1. Objectives

We mention that, initially, we conducted some studies focused on both the plantar pressure and the striking speed [4]. This time, we are interested in making a correlation between the two elements that compose the Karate-do technique and lead to efficiency (scoring the expected number of points).

2.2. Hypothesis

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Plantar pressure influences the execution speed.

2.3. Methods

In order to reach our goal, we initiated a research developed on many stages. In the beginning, our studies were focused on the aspects related to the plantar pressure, respectively on the execution speed. To achieve these desiderata, we used two objectivization systems, as follows:

- for the plantar pressure, the Pedar-X plantar pressure measurement system (we were the first to use it in the Romanian Karate-do field);
- for the strike execution speed, the Quintic information system (for the motion analysis and evaluation).

All the facilities necessary to our research were made available to us by the Laboratory of Biomechanics and Biomechatronics of the Department of Mechatronics and Fine Mechanics, Faculty of Mechanical Engineering and Mechatronics within the Polytechnic University of Bucharest. Athletes' technical training was performed in the Karate-do gym of the Suiko Sports Club of Lungulețu (a locality in Dâmbovița County), equipped with all the facilities required by this discipline.

The subjects of our research are performance athletes within the Suiko Sports Club, practitioners of Karate-do, with excellent competitive results: all of them reached the "podium" at least once in the national championship (for children, mini-cadets, cadets, juniors or youth). The 10 athletes of our sample were selected depending on each one's qualities and sports results obtained prior to the research initiation, therefore we firstly had in view the performance-related criterion and, last but not least, the age-related criterion (seniors aged 21 to 24 years old) and the gender-related criterion (males, rural environment), competitors in many weight classes.

The research took place between *1 September 2010 and 30 June 2011*, when we developed the following stages: subject evaluation – constitution of the working group; initial testing; implementation of the training program specific to the chosen theme; development of the specific training program; final testing.

2.4. Results

We made a correlation between the maximal pressure values (on left foot and on right foot – the correct stance) and the anthropometric parameters (weight, height, upper limb length, lower limb length), on the one hand, and the execution speed of the Karate-do strikes, on the other hand.

We found out that the coefficients of correlation had high to very high values, which proves that the striking speed is strongly influenced by the maximal pressure (the correct stance) on each foot. At the same time, we noticed that all the coefficients of correlation had positive values, which means that any of the couples of variables taken into consideration by us acts to the same direction. Therefore, if one of them has a descendent trend, the other will also have a descendent trend, and if one of them has an ascendant trend, the other will also have an ascendant trend.

Table 1. Subjects of the research

Crt. no.	Surname and name	Age	Weight	Height
1.	M.M.	22 years old	70 kg	1.84 m
2.	B.L.	21 years old	64 kg	1.68 m
3.	V.V.	21 years old	70 kg	1.75 m
4.	V.M.	23 years old	84 kg	1.83 m
5.	M.L.	23 years old	70 kg	1.73 m
6.	Z.V.	24 years old	70 kg	1.73 m
7.	M.N.	23 years old	86 kg	1.78 m
8.	M.S.	23 years old	80 kg	1.83 m
9.	S.V.	23 years old	63 kg	1.68 m

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