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EFFECT OF AN ANNUAL TAEKWONDO TRAINING PROGRAM ON THE ELECTROMYOGRAPHIC CHARACTERISTICS OF FRONTAL KICK YOP CHAGI

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ABSTRACT

Taekwondo is one of the most difficult and complex but one of the most complete and exciting Olympic sport. Fitness and conditioning are what you need to gain points with kicks that determine the level of competitive ability. The purpose of this study is to examine the results of an annual training program, in selected electromyographic variables of Yop chagi to maximize the performance of Taekwondo athletes. The sample consisted of 20 Taekwondo athletes, advanced holders of Black Belt, aged M = 19.11 years, sd = 3.45, height M = 1.73 cm, sd = 6.80 and weight M = 67.23 Kg, sd = 12.73 which were divided into 2 equal groups. The first team (TT), Training Team followed a specific fitness program, technique. The second group followed its own program, Control Group (CG). Surface electrodes (motion control co.) with preamplifier, an electronic shield (approved by the WTF) were used for the measurements. Electromyographic characteristics of the test were measured with the APAS (Ariel Performance Analysis System), dynamic and evaluated with Bioanalysis program. Three measurements were performed in this study, an initial, an intermediate a final measurement at the end of the program. The subject executes the technique of Yop Chagi kick, on the opponent's electronic chest, with simultaneously electromyographic activity of the Rectus Femoris (RF), the long head of Biceps Femoris (BF) and the lateral head of Gastrocnemius (GAS). The neuromuscular activity recorded during the execution of the technique in the experimental group for each muscle group is different from that of the control group. Athletes who followed the annual program improved their muscular pre-activation and activation, responded successfully enough to the execution of the kick, since a successful kick depends on both technical and physical condition.

KEYWORDS

Annual Training Plan, Fitness, Lateral Frontal Kick, Yop-Chagi, Dynamic, Kinematic, Electromyographic Features, Electronic Chest, Taekwondo Performance.

INTRODUCTION

Taekwondo is one of the most difficult and complex but one of the most complete and exciting Olympic sport. Fitness and conditioning are what you need to gain points with kicks that determine the level of competitive ability. Taekwondo is characterized by specific physiological requirements, including dynamic movements and strong kicks (Hammami et al., 2013). Coaches recognize that motor and functional skills have a significant impact on performance (Čular et al., 2013). International taekwondo athletes have low levels of body fat, moderate to high levels of cardiac respiration and high anaerobic power (Bouhlel et al., 2006; Bridge et al., 2014; Chan et al., 2003; Hammami et al., 2013; Hammami et al., 2014; Heller et al., 1998; Lin et al).

Kong et al. (2000) compared the lateral circular kick when performed with the front and back foot. The back foot creates more momentum (p = mv), and as a result the opponent finds difficult to block, that means opportunities for further attack are created. Unlike the rear foot the front one requires less time to contact due to the distance. Donovan et al (2006) found that TKD training may contain other material to increase the impact of hitting techniques during TKD competition such as elastic bands. This type of TKD also allows you to increase the technical speed that must be performed at maximum speed and power for optimal TKD performance. To increase the speed as well as the explosive power, the resistance training sessions performed with maximum speed allow the increase of the speed as well as the explosive power of the TKD athletes. Taekwondo

According to Fong et al., (2011) Taekwondo improves anaerobic capacity, strength, and muscle elasticity and accelerates the development of body control and balance. Several researchers (Bouhlel et al., 2006; Butios & Tasika, 2007; Heller et al., 1998; Markovic, Vucetic & Cardinale, 2008; Matsushigue et al., 2009) have studied anaerobic training in TKD, comparing lactic blood concentration before and after competition, found that there was a significant increase in blood lactate concentration and heart rate during TKD competition in elite players and by technical research by Jae-Woong et al. (2008) concerned the control of the contribution of basic torso movement and throughout the body. It was decided that the kick should be applied with a circular orbit of the foot in the form of running forward with one step.

The purpose of this study is to examine the results of an annual training program, in selected electromyographic variables of Yop chagi to maximize the performance of Taekwondo athletes.

METHODS

Sample

The sample consisted of 20 Taekwondo athletes, advanced holders of Black Belt, aged M = 19.11 years, sd = 3.45, height M = 1.73 cm, sd = 6.80 and weight M = 67.23 Kg, sd = 12.73 which were divided into 2 equal groups. The first team (TT), Training Team followed a specific fitness program, technique. The second group followed its own program, Control Group (CG).

Measuring Instruments

a) Surface electrodes (motion control co.) with preamplifier.
b) Electronic shield (approved by the WTF).
c) electromyographic characteristics of the test were measured with the APAS (Ariel Performance Analysis System), dynamic and evaluated with Bioanalysis program.

Data were analyzed using the SPSS 15 program for Windows.

Procedure

Three measurements were performed in this study, an initial measurement before the training program, an intermediate measurement in the middle of the program and a final measurement at the end.

The subject executes the technique of Yop Chagi kick, on the opponent's electronic chest, with simultaneously electromyographic activity of the Rectus Femoris (RF), the long head of Biceps Femoris (BF) and the lateral head of Gastrocnemius (GAS).

Figure 1: Measurement Procedures

Taining Programme

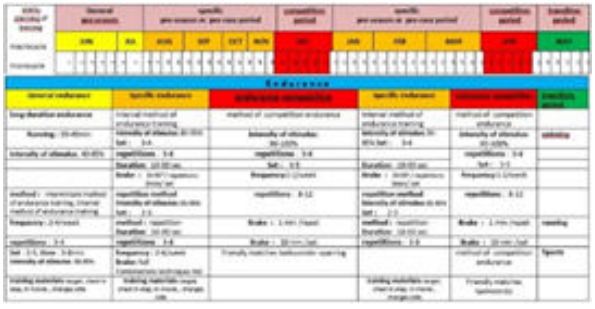


Figure 1: Annual endurance training program

Figure 2: Annual Strength training program

Figure 3: Annual speed training programm

Figure 4: Annual flexibility training program

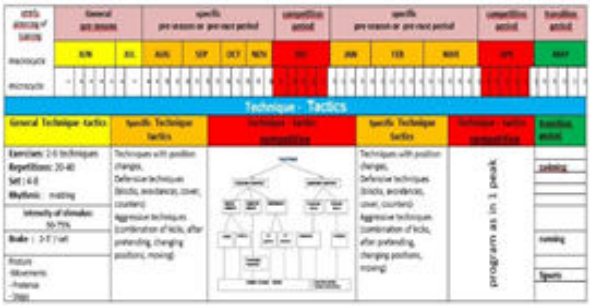


Figure 5: Annual technique and tactics training program

Statistical Analysis

RESULTS

The following tables show the following variables (EMG) of the, rectus femoris pre-activation rms (EMGPRORFrms), biceps Femoris pre-activation integration (EMGPROBFIntegr), maximal EMG activation value (EMGRFmax), rectus femoris maximal EMF (EMG) of the long biceps femoral head.

Table 1: Yop Chagi RF max

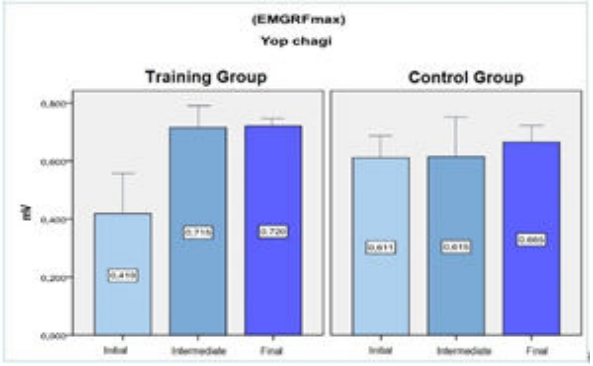


Table 2: Yop Chagi RF rms

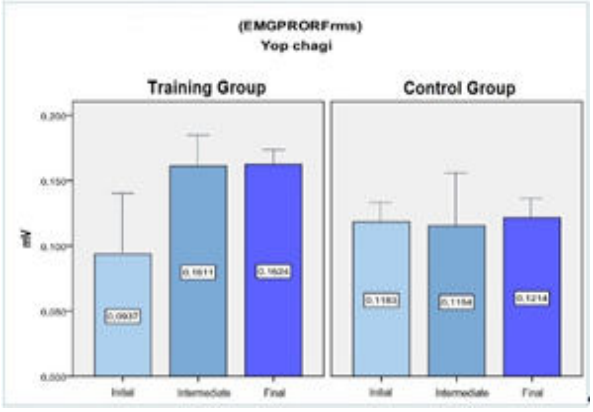


Table 3: Yop Chagi BF integration

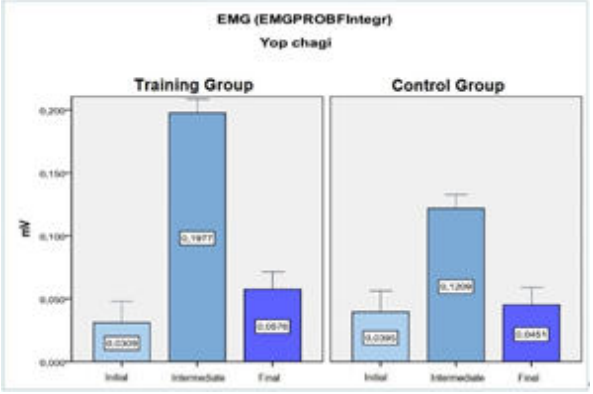
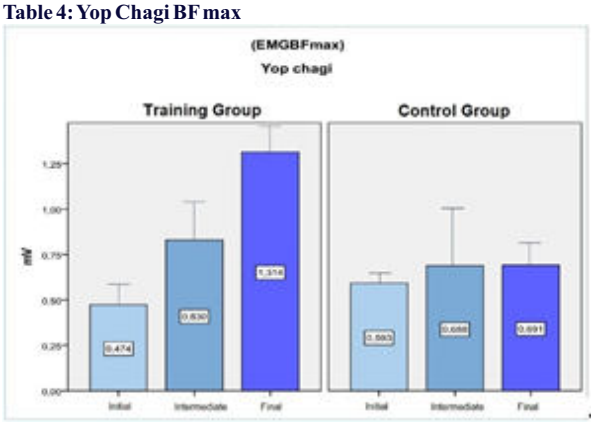


Table 4: Yop Chagi BF max



DISCUSSION

Surface electromyography is a valid method for assessing neuromuscular function (Winter et al., 1994). The neuromuscular activity recorded during the execution of the technique in the experimental group for each muscle group is different from that of the control group.

Also, the increased pre-activation that occurs in the second bounce kick according to Komi et al., (1978) proves that the elastic energy stored in the myotendinous system from the stretching phase is attributed to the shortening phase. The results of the kicks showed high frequencies in the kick in all three muscle groups Rf, BF and Gas and this has a great correlation with the increased strength that the Training team showed in relation to the control group.

According to Daniilidis (2010) in another study, the lateral circular kick (Bandal chagi) which was performed by bouncing had more intense muscular activity than the standing kick. Maybe if we performed one of the two techniques by bouncing the results, would be different.

Training team presented statistically significantly higher values in the muscle activity of the three muscles that were examined (gastrocnemius, rectus femoris and biceps femoris) on EMG. According to the literature this may be a result of the stiffness of the tendon of the extensor muscles of the lower extremities where the trained ones are superior to the untrained ones (Kubo et al. 2007) due to the better muscle pre-activation in fast stretching-contraction cycles that is found in all jumps and speedways (Schmidtbleicher & Gollhofer, 1982).

Same results were obtained for the Bandal chagi and Dollyo chagi techniques by Olive (2006), observed that the muscles achieve their greatest EMG activity in the early stages of movement.

CONCLUSION

Athletes who followed the annual program improved their muscular pre-activation and activation, responded successfully enough to the execution of the kick, since a successful kick depends on both technical and physical condition.

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