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CHARACTERISTICS OF HANDGRIP IN BRAZILIAN JUDO ELITE ATHLETES

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INTRODUCTION

Judo is a sport in which it is difficult to isolate which aspects can determine success in competition, considering the complexity and unpredictability of the techniques actions of combat [8]. Some authors [1, 13, 5], affirm that the foundation of grip or "*Kumi-Kata*" is decisive for the outcome of a fight. The *kumi-kata* is an essential foundation for the judoka, providing the first contact between the two athletes on fight and basic support for the implementation of other techniques [2]. In this sense, the *kumi-kata* consists of a skill handgrip, in which the ability to generate force effectively through the hands and fingers is crucial [4]. So, the parameters related to the ability of handgrip are of great importance for the efficiency of actions taken by judoka during combat [6, 9].

METHODS

The study included 08 Judo athletes, male (age $25 \pm 2,61$ years; height $1,77 \pm 0,10$ m; body weight $88,38 \pm 26,71$ kg), black belts, members of the Brazilian Team by Brazilian Judo Confederation and the year of collection, were participating in international competitions in search of points qualifiers for the London Olympics.

To characterize the actions of the hands and the types of handgrip utilized, a video recording was made during fight training sessions (*handori*) focusing in the athletes hands, identifying what type of grip was used in a specific site of the *judogi*. To identify the locations where they were made the *kumi-katas* and the hand with which this action was taken during the combats, were analyzed 03 videos of international competitions (Pan-Americans, World Cups, World Championships and Olympic Games) of each athlete. Data from training videos and of competition were subsequently crossed that if got up a quantification percentage of each type of handgrip used for each hand.

The instruments used to measure the maximum handgrip strength (FPM) two dynamometers were developed in Labin - UDESC. The analysis was carried out making use of the protocol of the American Society of Hand Therapists (ASHT) adapted [7], with a grip size fixed at 5,5 cm [12] for prehensions of the type palmar and 10 mm for Pinch prehensions [11]. Each athlete performed maximal effort during 30 seconds for each hand, with a acquisition

frequency of 1000 Hz, with verbal stimuli and without visual feedback. Three attempts were made, interspersed between the dominant and non-dominant hand. The force signals were processed using a routine developed in Matlab[®] environment (v.7.10.0, MathWorks inc., USA) where data were previously filtered through low pass filter type Butterworth of 4th order with cutoff frequency of 6 Hz, in according with was found as best cutoff frequency by residual analysis [14]. Data were normalized by the circumference of the forearm, given that this measure gives a very accurate information about the percentage of lean body mass in this segment, As was found by Arthurs e Andrews [3] using the *Dual-energy X-ray Absorptiometry* (DXA).

Statistical analyzes were performed using the SPSS software, 18.0 (SPSS Inc., Chicago, IL, USA). After checking the normality of data distribution (Shapiro-Wilk Test), was performed the T-test for paired samples (parametric data) and the Wilcoxon Test (nonparametric data) for comparisons of the dependent variables between hands.

RESULTS AND DISCUSSION

It was found that judokas use different forms of layout of the hand and fingers, depending on the site of *judogi* to be performed the *kumi-kata*. Several factors, as the load, format and function to be performed by the hands, may explain the use of different forms of handgrip on an object. Such specificity tends to optimize the interaction between the subject's hand and the object [10]. It was found that athletes performing the *kumi-kata* basically in four different locations on *judogi* and three types of handgrip: 1) in collars, using Full Palmar prehension ; 2) on the back, both above as below the opponent's arm, using Digit-Palmar prehension ; 3) in the belt both above as below the opponent's arm, also using the Digit-Palmar prehension ; and 4) in the sleeves, using prehensions of type association between Digit-Palmar and Lateral Pinchs (ADPLP).

The use of Full Palmar was higher in the dominant hand ($p=0,021$) as well as the Digit-Palmar ($p=0,033$), but the ADPLP was most used in non-dominant hand ($p=0,012$) (figure 1). When comparing the parameters of the force-time curve of identified types of handgrip, between the dominant

and non-dominant hands, no differences were found between any of the parameters studied (figure 1), which shows that high-level Brazilian Judo athletes performed handgrip strength similarly with both hands, regardless of laterality.

CONCLUSIONS

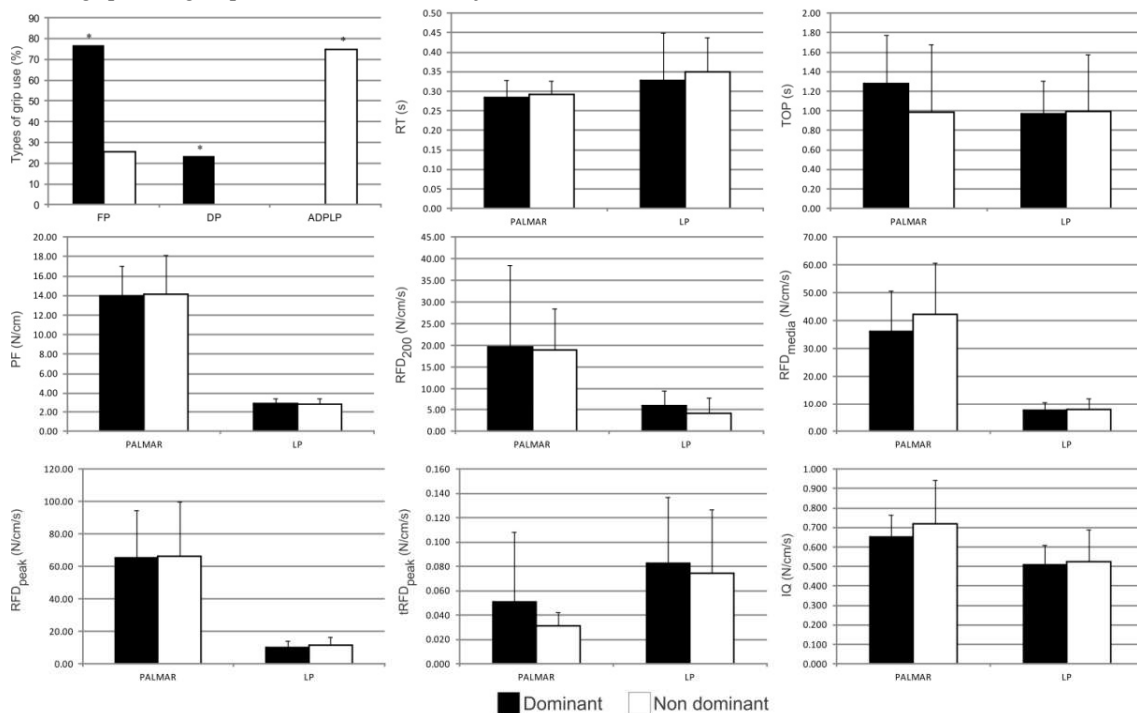
In high-level Brazilian judokas the handgrip parameters related to the force-time curve did not differ between the dominant and non-dominant hand, characterizing the symmetry of these parameters in this population, it is for developing similar performance capabilities in both hands or by the lack of specific training for each hand.

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*p<0,05. FP: Full Palmar, DP: Digit-palmar, ADPLP: Association between Digit-palmar and Lateral Pinch, (RT) Reaction Time, (TOP) time between onset Force Peak, (PF) Peak Force, (RFD200) Rate of Force development in 200ms, (RFDmedia) media of Rate of Force development, (RFDpeak) Peak Rate of Force development, (tRFDpeak) time to the Peak Rate of Force development, (IF) Index Fall of Force.

Figure 1. Results of usage percentage of handgrip types and results of the parameters of force-time curve.