77 - EVALUATION OF THE HANDLING STRENGTH IN MARTIAL ARTS PRACTICERS

ROSA, Ricardo C.;
BRASILINO, Fabricio F.;
MORALES, Pedro J. C.
Physical Education Course – UNIVILLE/SC
Research Group Em Movimento
ricardoclemente_personal@yahoo.com.br

doi:10.16887/88.a1.77

Introduction

In primitive times, the need to defend itself to survive, made the man develop several techniques of struggle that would guarantee food and defense against enemies and predators (LEE, 1978). Therefore, martial arts have their origins rooted in that of the emergence of man, in the beginnings of civilization. In the war he had his work in the preparation of warriors creating various methods of combat, each method with its own characteristics of ideas and movement, to protect his kingdom (Neto, 2006).

Training was usually done in secret, by a few people, and the transmission of knowledge was mostly oral, constituting few historical documents as a reference (Persson, 2007). With the progress of mankind, concepts related to martial arts have been furthered by promoting their growth not only for the sake of self-defense, but as the discipline that seeks to develop body and mind (Persson, 2007). Coming from the eastern peoples began to become increasingly popular acquiring adherents in several countries of the West (Lee, Dive, 1978). In addition to the many benefits provided to physical and mental health, it has gained its place in the sports environment and is widespread in the world (Neto, 2007; Persson, 2007).

This great progress has allowed for an expansion in the scientific studies on martial arts in a better understand the physiological responses resulting from martial training, thus contributing to the increase of the performance of practitioners and athletes. Among the various styles, the purpose is to potentiate the effects of blows performed by body members such as hands, feet, elbows and knees, in a make them more efficient in a situation of danger or competition (Persson, 2007).

Since the hands play a fundamental role in the performance of exercises and the use of blows, it is important to evaluate the manual grip strength and the influence of this training to increase this ability. The dynamometer has been mentioned in the international literature as the most efficient device to measure palmar grip strength, being a fast, low-cost and non-invasive procedure (Lucareli, 2010, Oliveira, 2003, Schlüsel, Aanjos, Kac, 2008; Silva, 2009).

Manual dynamometry is a measure of isometric strength (Guimarães, 2005; Robergs, Robergs, 2002; Silva, 2009), which consists of the application of force on two bars that are connected to each other, as they are tightened, a displacement of the bars occurs, causing a change in the resistance of the sealers, affecting a production of voltage directly proportional to (Keller et al., 2008), which is the most commonly used method of hand gripping (McAllister et al., 2008).

This force of gripping performed on the dynamometer can be established in kilograms / force or pounds / inches (Moreira, 2003). Its clinical use deserves a great deal of attention in recent years, serving as an indicator of total body strength, and thus used in physical fitness tests (Moreira, 2003; Moura, Moureira, Caixeta, 2008; Oliveira, 2009; Schlüsel, Angels, Kac, 2008). Consequently, it has been recognized as a useful tool for functional evaluation, since the movements performed by the hand as transport, grasping and manipulation of objects are essential for the activities of daily living (Moura, Moreira, Caixeta, 2008; Oliveira, 2008). And the reduction of these functions may be related to possible pathologies (Guimarães, 2005; Moura, Moureira, Caixeta, 2008; Oliveira, Moreira, 2009).

According to the study of Napier (Napier, 1983), there are two basic patterns of grip: strength and precision. He defined hold of force when full force is required, as in activities that require the action of the fingers and thumb against the palm of the hand transmitting force to a given object (Moreira, 2003; Moura, Moureira, Caixeta, 2008; Napier, 1983).

Precision gripping is the most delicate form and refers to securing the object between the palmar or lateral face of the fingers and the opposing thumb (Moreira, 2003; Moura, Moureira, Caixeta, 2008; Napier, 1983). Thus, the importance of manual grip strength measurement is to provide information that can either reflect health status or predict performance for certain sports modalities. From the relation of all these aspects, the purpose of the present study is to use dynamometry as a methodology for the evaluation of manual grip strength in martial arts practitioners.

Methodological Procedures

Thirty-eight practitioners of martial arts constituting the Martial Arts Group (MAG) and 18 sedentary individuals, constituting the Control Group (CG), participated in the study. MAG was composed of 26 males with a mean age of 22.50 ± 8.09 years, body mass of 69.66 ± 11.78 kg, height of 1.72 ± 0.07 m, and 12 females with a mean age of 22.08 ± 6.99 years, body mass 56.06 ± 10.46 kg and height 1.59 ± 0.09m.

CG was composed of 6 males with mean age of 30 ± 11.55 years, body mass 70.50 ± 13.88 kg, height 1.76 ± 0.04 m, and 12 females with a mean age of 27 ± 10.69 years, body mass 62.21 ± 14.59 kg and height 1.64 ± 0.08m. Subsequently, for better analysis the MAG was subdivided into the modalities that formed it, to verify which group would have the best performance for palmar gripping ability.

Thus, the Muay Thai group (MTG) was created with 20 practitioners and the Karate group (KG) with 18 practitioners. Of the participants who were part of the MTG, 13 were males with a mean age of 22 ± 7.04 years, body mass 73.33 ± 12.36 kg, height 1.73 ± 0.07 m, and 7 females with age mean of 25.57 ± 6.77 years, body mass 59.62 ± 11.65kg and height 1.59 ± 0.10m.

The KG was formed by 13 male practitioners with a mean age of 23 ± 9.28 years, body mass 65.99 ± 10.36 kg, height 1.71 ± 0.07 m, and 5 females with a mean age of 17.20 ± 3.83 years, body weight 51.08 ± 6.64 kg and height 1.59 ± 0.06m. It was an inclusion criterion to be part of the MAG, subjects who underwent training in a systematized form for a minimum period of 6 months and with weekly frequency of three training sessions lasting 1 hour.

For both MAG and CG, subjects could not present musculoskeletal lesions, or any special health condition (fever, virus, use of anti-inflammatory drugs) that interfered with the results.

Regarding the CG, it was inclusion criterion that is part of the group, the subjects that were inactive, having as activity only the daily commitments.

A scale of the Filizola® brand Personal, with a precision of 100g and a stadiometer fixed to the wall with a precision of 0.1 cm, was used to measure body mass and height. To measure the manual grip strength, a dynamometer of the Takei Physical Fitness Test Grip - A® brand was used.

The identification of the group was performed through an anamnesis of health and physical activity. Initially, all the subjects in the sample received explanations on how they would be tested and, in agreement, signed a Free and Informed Consent Form, which explained the procedures performed - National Health Council (nº 466/12).

All of them underwent an evaluation that consisted of an anamnesis concerning the state of health and physical activity. After the groups were screened (MAG, CG and later MTG and KG), a demonstration was performed before the beginning of the tests. The body mass and height of all the volunteers were verified, to begin the manual grip test.

The subjects' positioning for the test followed the ACSM protocol (ACSM, 2006), where the subjects remained standing with lateral detachment of the lower limbs, upper limbs along the body, wrist and forearms in the semi-pronated position. The dynamometer remained parallel to the side of the body approximately at waist level, with its scale facing the evaluator.

The forearm was at the level of the thigh, allowing the evaluated to slightly flex the arm. Before performing the test, the dynamometer's movable bar was adjusted so that it fit comfortably inside the evaluated hand, and checked if the hands were at zero point. Next, the assessor was asked to tighten with maximum force the dynamometer's movable bar with care not to catch the breath (Valsalva maneuver) in a time of 5 seconds. During the execution of the test, flexion or extension of the wrist was not allowed, also avoiding the use of the thumb in the action of the palmar grip.

Three attempts of maximal contraction were performed with the right hand and another three with the left hand alternately, with an interval of 30 seconds between them for rest.

Soon after, the highest of the three readings for each hand was verified, and these two values (one of each hand) were added as the measure of the manual grip strength, to be compared then the norms for grip strength by age group and sex for hands right and left combined (ACSM, 2006).

For the manual grip strength comparisons between the groups in the present study, the paired and unpaired Student t test was used. The level of significance was set at $p < 0.05$.

Results and Discussion

The results obtained in the manual grip test are shown in table 1. The values obtained were stratified in percentages and through the mean (± standard error of the mean) of dynamometry.

Table 1 – Classification of the results of the Manual Grip Test.

Classification	n	Above Average	Average	Below Average	Precarious	DYN(kg/f)
MAG	38	13 %	3 %	21 %	63 %	75,31±22,03
CG	18	0 %	28 %	17 %	55 %	65,13±25,09
MTG	20	20 %	5 %	30 %	45 %	79,12±22,95
KG	18	6 %	0 %	11 %	83 %	71,08±20,78

DYN = Dynamomety; AMG = Martial ArtsGroup; CG = ControlGroup; MTG = Muay Thai GroupKG = KarateGroup.

According to the analysis of the results it can be observed that 45% of sedentary subjects (GC) and 37% of martial artists (MAG) are classified above the level considered precarious. The mean of the dynamometry was 75.31 ± 22.03 kg / f for martial artists and 65.13 ± 25.09 kg / f for sedentary subjects.

Analyzing the data statistically, there was no significant difference between the mean values found in dynamometry (kg / f) for AMG and CG ($p = 0.06$). AMG subdivision for MTG and KG was verified, with 55% of MTG and 17% of GK ranking above the level considered precarious, and when analyzed statistically, also did not show significant differences for the data obtained ($p = 0.13$). In the comparison of the modalities (MTG and KG) with the CG, the statistical analysis only proves the difference between MTG and GC ($p = 0.04$).

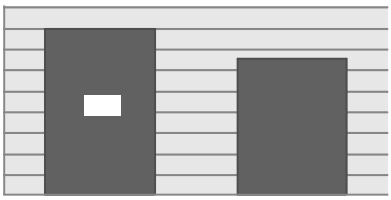

Figure 1 – Mean values obtained after the manual grip test expressed in kilograms / force.

The importance of an evaluation method depends on its fidelity in delineating a variable. Therefore, investigating the possible factors that may influence the results obtained through this method becomes fundamental to the study. In this research, it was verified that the manual grip strength might be related to the type of activity performed.

When comparing MAG and CG, it is possible to see that martial arts training did not have a great influence on the manual grip force, leaving a considerable portion of the sample (63%) classified as precarious. However, with the GAM subdivision for the modalities that formed it (MTG and KG), there was a statistically significant difference between GMT and GC ($p = 0.04$), demonstrating a better performance in palmar grip strength for practitioners of muay thai in relation to CC and KG.

This factor may be related to the exercises performed in the practice of muay thai, such as, for example, securing the kickers and punches, which require great manual grip strength. In a study by Borges Jr et al. (2009), comparing the isometric grip strength of aikido, jiu-jitsu, judo and rowing athletes, it was verified that the highest strength value corresponded to jiu-jitsu athletes (dominant hand = 564.9 ± 18.9N - non-dominant hand = 537.6 ± 14.1N), this being another indicative of the training specificity.

Muscle strength used to designate the ability of a muscle, or muscle group, to produce or resist a force (Schlüsel, Anjos, Kac, 2008). The origin and increase of the force, depends on the transversal area of the muscle and the training to which this muscle is submitted (Schlüsel, Anjos, Kac, 2008). There are other individual characteristics that influence the measurement of manual dynamometry, including body mass and height, which has a positive correlation for healthy individuals up to 98kg and 1.90m (Schlüsel, Anjos, Kac, 2008).

Analyzing data on mean body mass and height of MTG (body mass 68.54 ± 13.58 - height 1.68 ± 0.11), KG (body mass 61.85 ± 11.55 - height 1.68 ± 0.08) and CG (body mass 64.51 ± 14.49 - height 1.68 ± 0.09), it is possible to observe that the MTG