

MANUAL GRIP STRENGTH IN JUDOCAS FROM THE PROJECT: `` LUTA QUE TRANSFORMA`` (FIGHT THAT TRANSFORMS)

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Abstract: Introduction: Changes in strength, power, speed, endurance and physical abilities occur continuously and can highlight the best strategies for identifying talent, preventing diseases, training and increasing performance. Handgrip strength (HGS) is an essential variable in judo, considering that it is a grappling modality. **Objective:** Identify handgrip strength in judokas from the Project: `` *Luta que Transforma* `` (``Fight that Transforms``). **Materials and methods:** 57 4th year students participated, 37 females (10.47±0.79 years) and 20 males (10.26±0.52 years); 30 5th year students, 16 females (11.63±0.86 years old) and 14 males (12.37±1.48 years old), from Elementary School at CIEP Luciano Gomes Ribeiro in the city of Valença /RJ. Height, body mass, relative fat percentage (%BF) and handgrip strength test (HGS) were measured. **Results:** The HGS for 4th year males were 17.7±4.3 Kgf and for females 18.1±3.7 Kgf; for the 5th year, males weighed 22.2±6.5 Kgf and females weighed 23.2±6.9 Kgf. **Conclusion:** It was concluded what is there prevalence of malnutrition, as well as excess weight. HGS presented higher values for 5th year judokas, of both sexes, compared to their 4th year peers. For male individuals in the 5th year, the HGS values were higher than those referenced in the literature. **Keywords:** Manual Grip Strength; Children; Judo.

INTRODUCTION

In 2018, the Faculty of Physical Education of the ``Centro Universitário de Valença`` (UNIFAA) began developing the extension project entitled: ``*Luta que transforma*`` (``Fight that Transforms``), which has the fundamentals of judo as its pedagogical basis. The project follows the principles left by Jigoro Kano, founder of judo, with the modality being used as a means of physical, mental, moral, aesthetic and social education (VIRGÍLIO, 1986).

The project takes place at CIEP Luciano Gomes Ribeiro, benefiting boys and girls, in the 4th and 5th year of Elementary School, from families living in socially vulnerable situations in the city of Valença/RJ.

The vulnerability of poor families is intrinsically linked to health and nutrition conditions. Families living in poverty often face a series of barriers that compromise their physical and mental well-being. Economic precariousness limits access to nutritious foods, resulting in poor diets that can lead to malnutrition or obesity.

Assessing body composition is relevant, since, through anthropometric measurements, nutritional status can be assessed and disorders related to low and/or high body adiposity, as well as metabolic risks, can be detected. Based on the results obtained, necessary interventions can be carried out to improve the quality of life of the boys and girls evaluated (KAY, 2005).

A greater amount of muscle mass can significantly contribute to increased strength, power, performance of motor skills, speed gains, development of physical fitness and reduced risk of injuries during puberty (KANEHISA et al., 1995; STRICKER et al., 2020). It is also worth highlighting that overweight children and adolescents have lower relative muscle strength when compared to normal weight adolescents (TIBANA et al., 2013). According to Philippaerts et al. (2006), Malina and Bouchard (2009) and Ramos et al. (2021), changes in strength, power, speed, endurance and physical abilities occur continuously and can highlight the best strategies for identifying talent, preventing diseases, training and increasing performance.

Therefore, Iermakov, Podrigalo and Jagiello (2016) proved that handgrip strength is an important factor in the success of martial arts athletes who are characterized by throws and catches aimed at the opponent's body.

Gonçalves, Benassi and Oliveira (2012) show as a reference value for male judokas, between 10 and 13 years old, the value of 20.55 ± 5.15 Kg/f.

In view of the above, the importance of assessing body composition and muscle strength is evident both for the child's maturational development and for improving physical performance. Furthermore, the children in the project also need specialized information about health and physical exercise, making it necessary to evaluate and monitor longitudinally body adiposity and physical capabilities, as children and teenagers overweight have lower relative muscle strength (ZEMBURA et al., 2023).

Therefore, the objective of the present study was to identify handgrip strength and body adiposity in judokas from the project: *``Luta que Transforma``* (*``Fight that Transforms``*).

MATERIALS AND METHODS

This study was approved by the UNIFAA Research Ethics Committee, in accordance with Resolution CNS 466/2012, under CAAE number:67147723.0.0000.5246. All those responsible for the participants in this study signed the Free and Informed Consent Form (ICF). As an inclusion criterion, individuals must be participants in the project: *``Luta que transforma``* (*``Fight that Transforms``*). The exclusion criteria were: the presence of physical disabilities (permanent or temporary) that made it impossible to perform evaluations; use of a pacemaker; use of medications that could interfere with body composition or physical capabilities; non-agreement of parents or students.

Anthropometric measurements of body mass and height were performed according to Lohman, Roche and Martorell (1987). Height was measured, in centimeters, using a portable stadiometer (Portable Stadiometer 210, Wiso, Florianópolis, Brazil), with an accuracy of 0.1

cm. Body mass and body composition were analyzed using a segmental multifrequency bioimpedance scale (Inbody 270, Biospace Co, Seoul, Korea).

To assess body composition, the scale performs analysis using a tetrapolar system of 8 (eight) electrodes, emitting frequencies of 20kHz and 100 kHz. The values of relative fat percentage, skeletal muscle mass and hydration level were verified. Students were instructed on the collection protocols in advance and 24 hours before the tests. The pre-test protocols were in accordance with the recommendations of Heyward (2000).

- Fasting from food and drinks for 4 hours before the exam time.
- Drink two glasses of water (500ml) two hours before the test.
- Do not consume alcoholic beverages 48 hours before the exam.
- Avoid excessive consumption of foods rich in caffeine (chocolates, dark teas and coffee) the day before the exam.
- In the 12 hours before the exam, do not perform moderate or intense physical exercise.
- Not to be in a menstrual period.
- Do not be feverish on the day of the test.
- Urine at least 30 minutes before taking the exam.

The tables proposed by Jebb et al. (2004), were established as criteria for interpreting %BF in boys and girls.

To evaluate handgrip strength, a manual dynamometer (Baseline, New York, USA) was used, which consists of a hydraulic measurement system. As the participant squeezes the bars, they cause a change in the gauges, which is directly proportional to the force exerted on the bars. The participant held this hand grip for 3 (three) seconds, with as much force as possible, sitting in a chair with their feet flat on the floor and their lumbar back resting on the back of the chair. The shoulders

were close to the torso, the elbows were flexed at 90° (FESS, 1982). The participant had three opportunities to perform with the dominant limb. The largest measurement between runs was noted.

All assessments of students of both sexes were supervised by at least 2 (two) people inside the assessment room to avoid embarrassment or anything like that. The person responsible was also allowed to be present to monitor the evaluations, if he or she deemed it necessary. The attire for the boys' assessment will be shorts. The girls wore a blouse and shorts or similar two-piece outfit. Descriptive statistics were used to characterize the sample. The statistical package SPSS version 27.0 was used to analyze the data.

RESULTS

The 4th year students participated in this research, 37 females (10.47±0.79 years old) and 20 males (10.26±0.52 years old); 30 5th year students, 16 females (11.63±0.86 years old) and 14 males (12.37±1.48 years old), from Elementary School at CIEP Luciano Gomes Ribeiro in the city of Valença/RJ. Data regarding height, body mass, relative fat percentage and upper limb strength were described in table 1, considering the year of schooling and sex of the research volunteers.

Variables	4th year		5th year	
	Male (n=20)	Female (n=37)	Male (n=14)	Female (n=16)
Height (cm)	144.1 ± 7.3	144.0 ± 7.0	151.8 ± 11.1	153.3 ± 7.7
Body mass (kg)	43.6 ± 13.0	35.0 ± 8.8	40.1 ± 7.5	48.4 ± 16.9
Relative fat (%G)	31.6 ± 12.4	20.3 ± 9.1	17.8 ± 8.1	24.4 ± 10.9
Upper limb strength (Kgf)	17.7 ± 4.3	18.1 ± 3.7	22.2 ± 6.5	23.2 ± 6.9

Table 1: Results of the variables divided by year of schooling and gender.

Caption: upper limbs: upper limbs;
Kgf=kilogram force.

Males in the 4th year had a height of 144.1 ± 7.3 cm and females 144.0 ± 7.0 cm; 5th year males had a height of 151.8 ± 11.1 cm and females had a height of 153.3 ± 7.7 cm. Regarding body mass, in the 4th year it is observed for males 43.6 ± 13.0 kg and for females 35.0 ± 8.8 kg; and in the 5th year for males 40.1 ± 7.5 kg and for females 48.4 ± 16.9 kg.

In terms of nutritional status, a level of malnutrition assessed by %BF was found to be 31.5% and 20.0% for the 4th and 5th year, respectively. For the item overweight (sum of overweight and obesity), a total of 38.6% was found in the 4th year, and 23.4% in the 5th year.

Upper limb strength was identified through handgrip strength: for the 4th year, males presented 17.7 ± 4.3 Kgf and females 18.1 ± 3.7 Kgf; for the 5th year, males presented 22.2 ± 6.5 Kgf and females 23.2 ± 6.9 Kgf.

DISCUSSION

The objective of the present study was to identify handgrip strength and body adiposity in judokas from the project: *“Luta que transforma”* (“Fight that Transforms”). Thus, the main finding of the present study was that the children participating in project: *“Luta que transforma”* (“Fight that Transforms”), that was presented higher HGS values for 5th year judokas, of both sexes, compared to their 4th year peers. For male individuals, in the 5th year, the HGS values were higher than the higher than that referenced in the literature for individuals between 10 and 13 years of age, although they have greater height and body mass.

Anthropometric techniques are important for estimating the prevalence and degree of nutritional changes, thus allowing monitoring for health, disease, physical fitness and quality of life purposes (BRANDÃO, 2010). According to Pedraza et al. (2016) anthropometric indices

have been considered valid for generating sensitive indicators of nutritional status.

In the biological sense, the World Health Organization (2024) points out that many low and middle-income countries face the so-called double burden of undernutrition, where it is common to find undernutrition and obesity coexisting in the same country. This fact corroborates our findings in both classes, in which high prevalences of malnutrition were found, as well as overweight, in which the prevalences were well above the prevalence found in the world of 20.0% for boys and girls between 5 and 19 years old (WHO, 2024). Tibana et al. (2013) showed that overweight children and adolescents have lower relative muscle strength when compared to normal weight adolescents.

From the point of view of success in judo, Iermakov, Podrigalo and Jagiello (2016) pointed out that handgrip strength is an important success factor for martial arts athletes whose characteristics are throws and catches directed at the opponent's body. Gonçalves, Benassi and Oliveira (2012) show as a reference value for male judokas, between 10 and 13 years old, the value of 20.55 ± 5.15 Kg/f.

By identifying the handgrip strength of the members of the project: *“Luta que transforma”* (“Fight that Transforms”), we can infer that this variable is below the value indicated for male individuals in the 4th year.

For male participants in the 5th year, the values presented were higher than the referenced values. This identification will serve as a basis and control in the prescription and development of training for the judokas of the project: *“Luta que transforma”* (“Fight that Transforms”).

Barroca (2023) identified that at the age of 11 there is no difference in the ability to produce HGS between boys and girls. He also presented in his findings that at the age

of 12, boys and girls have the same ability to generate HGS strength. Contrary to the above, the findings of this research showed higher values for girls in the 4th year and 5th year of Elementary School in FPM compared to boys. In parallel, Chen et al. (2018) found no significant difference between the sexes in the ability to generate HGS.

The literature shows (Barroca et al., 2023) that for girls at the age of 11 there is no difference in the ability to generate HGS, between the dominant and non-dominant hands. At the age of 12, girls have a greater ability to produce HGS with their dominant hand. Comparing HGS data from girls in the 4th and 5th year of Elementary School, it is noted that HGS values are higher in judokas in the 5th year of Elementary School compared to data from the 4th year of Elementary School.

It is known that the prediction of sports performance, through motor tests, such as HGS assessment, is important for judo coaches and physical trainers. Lima et al. (2014) suggest that the longer the time spent practicing sports in judo, the greater the handgrip strength. This justifies the handgrip strength in the 5th year participants, who have been in the project for at least a year, so we can infer that the project classes contributed to the values obtained. Ribeiro et al. (2023) found that Brazilian coaches consider the technical grip ability to be an important factor and indicator of sporting potential for the development of talented young judokas.

Thus, according to Philippaerts et al. (2006), Malina and Bouchard (2009) and Ramos et al. (2021), changes in strength, power, speed, endurance and physical abilities occur continuously and can highlight the best strategies for identifying talent, preventing diseases, training and increasing performance.

In judo, dynamic strength, speed and agility were discriminatory characteristics for judo (PION et al., 2014; ZHAO et al., 2019).

CONCLUSION

It was verified that the members of the Project: *``Luta que transforma``*, that they have a high prevalence of malnutrition, as well as being overweight.

Handgrip strength is below the value referenced for male participants in the 4th year and was higher for male participants in the 5th year.

It is worth noting that the handgrip strength values expressed by upper limb strength are parameters to be considered when training children, considering that it is important for grip disputes, application of blows while standing and on the ground in this modality.

As it is a longitudinal study, the data from this research only gives us a view of the students' current state and, after the next data collection, we will be able to compare with these findings and understand the annual changes in a more comprehensive way.

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REFERENCES

1. BARROCA, M. R. Estudo da força de preensão manual em escolares: correlação com variáveis antropométricas e descrição de valores de referência. 27 jun. 2023.
2. BRANDÃO, M. L. **Avaliação da composição corporal em jovens adolescentes – comparação entre jovens adolescentes praticantes e não praticantes regulares de actividade física**. 2010. Dissertação (Mestrado em Educação Física) - Faculdade de Desporto, Universidade do Porto, Porto.
3. CHEN, C.-Y. et al. Reference values of intrinsic muscle strength of the hand of adolescents and young adults. **Journal of Hand Therapy**, v. 31, n. 3, p. 348–356, 1 jul. 2018.
4. FESS, E. E. Proceedings American Society of Hand Therapy. The effects of Jamar dynamometer handle position and test protocol on normal grip strength. *The Journal of Hand Surgery, Philadelphia*, v. 7, n. 3, p. 308-309, 1982.
5. GONÇALVES, L. C. O.; BENASSI, R.; DE OLIVEIRA, A. L. B. Valores de referência de força de preensão manual para homens praticantes de judô. **Revista Brasileira de Prescrição e Fisiologia do Exercício (RBPFE)**, v. 6, n. 32, p. 6, 2012.
6. HEYWARD, V. H.; STOLARCZYK, L. M. **Avaliação da composição corporal**. 1. ed. São Paulo: Manole, 2000.
7. IERMAKOV, S.; PODRIGALO, L. V.; JAGIEŁŁO, W. Hand-grip strength as an indicator for predicting the success in martial arts athletes. 2016.
8. JEBB, S. et al. New body fat reference curves for children. **Obesity Rev.** v. 12, p. A156–157, 2004.
9. KANEHISA, H. et al. A cross-sectional study of the size and strength of the lower leg muscles during growth. **Eur J Appl Physiol Occup Physiol**, v. 72, p. 150–156, 1995.
10. KAY, S. A psicologia e a antropometria da imagem corporal. In: NORTON, K.; OLDS, T. **Antropométrica**. Porto Alegre: Artmed, p. 231-252, 2005.
11. LIMA, M. C. et al. Força de preensão manual em atletas de judô. **Revista Brasileira de Medicina do Esporte**, v. 20, n. 3, p. 210–213, jun. 2014.
12. LOHMAN, T. G. The use of skinfolds to estimate body fatness on children and youth. **Journal of Physical Education, Recreation & Dance**, v. 9, p. 98-102, 1987.
13. MALINA, R. M.; BOUCHARD, C.; BAR-OR, O. **Crescimento, maturação e atividade física**. 2. ed. São Paulo: Phorte, 2009.
14. PEDRAZA, D. F. et al. Índices antropométricos de crianças assistidas em creches e sua relação com fatores socioeconômicos, maternos e infantis. **Ciências & Saúde Coletiva**, v. 21, n. 7, p. 2219-2232, 2016.
15. PHILIPPAERTS, R. M. et al. The relationship between peak height velocity and physical performance in youth soccer players. **J Sports Sci**, v. 24, p. 221–230, 2006.
16. PION, J. et al. The value of non-sport-specific characteristics for talent orientation in young male judo, karate and taekwondo athletes. 20 jun. 2014.
17. RAMOS, G. P. et al. Comparison of physical fitness and anthropometrical profiles among Brazilian female soccer national teams from U15 to senior categories. **J Strength Cond Res**, v. 35, n. 8, p. 2302-2308, 2021.
18. RIBEIRO, A. A. D. S. et al. Talent identification and development in judo: A perspective from Brazilian coaches. **International Journal of Sports Science & Coaching**, v. 18, n. 1, p. 38–45, fev. 2023.
19. STRICKER, P. R. et al. Resistance Training for Children and Adolescents. **Pediatrics**, v. 145, n. 6, p. e2020101, 2020.
20. TIBANA, R. A. A força de preensão manual como marcador de saúde em adolescentes com sobrepeso. **A força de preensão manual como marcador de saúde em adolescentes com sobrepeso**, Brasília Med. v. 50, n. 4, p. 288–295, 2013.
21. VIRGÍLIO, S. **A arte do judô**. 1. ed. Campinas: Papirus, 1986.
22. WORLD HEALTH ORGANIZATION. **Obesity and overweight**. 2024. Disponível em: <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight>. Acesso em: 15 abr. 2024.
23. ZEMBURA, M. et al. Skeletal muscle mass, muscle strength, and physical performance in children and adolescents with obesity. **Frontiers in Endocrinology**, v. 14, p. 1252853, 2023.
24. ZHAO, K. et al. Physiological, Anthropometric, and Motor Characteristics of Elite Chinese Youth Athletes From Six Different Sports. **Frontiers in Physiology**, v. 10, 2019.