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Morphofunctional characterization of male Marajoara wrestlers

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Abstract

Background & Study Aim: Marajoara Wrestling is widely practiced in the Marajó Archipelago (Northern Pará state, Brazil), but still little known in the combat sport milieu. The aim of this study was the knowledge about anthropometric data, motor aspects and correlation variables of Marajoara wrestlers, and also establishing possible performance indicators that can characterize this modality.

Material & Methods: The sample consisted of eight competitive male athletes, aged between 23 and 53 years. The data were analyzed using Pearson's linear correlation, the Shapiro-Wilk test and a significance level of $p<0.05$.

Results: Based on the results, the following can be concluded: 1) isometric hand grip strength (HGS) and thoracolumbar flexibility are strong indicators of performance; 2) Marajoara wrestlers exhibit much higher isometric hand grip strength when compared with athletes from other grappling sports; 3) There is a strong statistical relationship between isometric hand grip strength and thoracolumbar flexibility.

Conclusion: It is believed that this information will be incorporated into Marajoara Wrestling training programs. Furthermore, wrestlers, sports organizations and traditional Marajó Archipelago populations should benefit from the information reported here, considering the growing concern with "sportifying" the modality and its national and international recognition in the world of combat sports.

Keywords: combat sports • grappling sports • performance • technique • traditional wrestling

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INTRODUCTION

Grappling – *noun* (*in combat sports such as wrestling and martial arts*) the act of holding your opponent to subdue or control them [21].

Hand grip – *noun* a resistant piece of equipment used to develop hand strength [21].

Technique– *noun* a way of performing an action [21].

Motor – *adjective* relating to muscle activity, especially voluntary muscle activity, and the consequent body movements [21].

Neuromuscular – *adjective* referring to both nerves and muscles [21].

Performance – *noun* the level at which a player or athlete is carrying out their activity, either in relation to others or in relation to personal goals or standards [21].

Cardiovascular disease – *noun* reduced function of the heart and arteries caused by excessive intake of saturated fats. Abbreviation CVD [21].

Acute – *adjective* used for describing pain that is sharp and intense [21].

Articular – *adjective* relating to joints [21].

Flexibility *noun* **1.** the amount or extent to which something can be bent **2.** the extent to which something can change or respond to a variety of conditions or situations [21].

Isometric – *adjective* **1.** involving equal measurement **2.** used for describing muscle contraction in which tension occurs with very little shortening of muscle fibres **3.** used for describing exercises in which the muscles are put under tension but not contracted [21].

The Marajó Archipelago is located at the mouth of the Amazon River in Northern Pará state, Brazil. It is home to the grappling/takedown modality known as Marajoara Wrestling (MW). Despite the scarcity of specific studies on its roots, it is believed that this form of wrestling originated centuries ago with the primitive inhabitants of the islands [1].

With respect to its animal-like techniques and style (which also occurs with other traditional combat sports such as kung fu), MW is a grappling modality that seeks to throw the adversary to the ground using an off-balancing technique by removing the opponents' leg support with one's hands and feet, altering their center of gravity and defending oneself by applying leverage to throw the opponent to the ground, or force to resist the attack. Thus, as a grappling modality, it exhibits the basic characteristics of other sports such as spatiality/distance and motor action [2, 3]. In these conditions, the short distance between opponents is essential to executing the motor action (applying techniques), which should occur within this restricted space. Thus, during a grappling event there is a permanent demand for movement, with trunk and upper limb mobility, both standing (vertical posture) and on the ground (horizontal posture) [4]. This condition, which is also associated with the athlete's flexibility level, is one of the key points in the study of neuromuscular performance in combat sports [4].

It is important to underscore that anthropometric, motor and sports performance data related to MW as a combat sport are scarce, thereby justifying the present investigation to better understand it. As such, the aim was the knowledge about anthropometric data, motor aspects and correlation variables of Marajoara wrestlers, and also establishing possible performance indicators that can characterize this modality.

MATERIAL AND METHODS

Subjects

The sample consisted of eight male Marajoara wrestlers. All the participants had competitive experience, but without regular training and planning. The following inclusion criteria were adopted: participants had to be men, aged between 23 and 53 years, be competitors with technical experience and knowledge of the rules. Excluded were individuals with cardiovascular disease, and musculoskeletal or articular disorder in the acute phase.

The study complied with Resolution no. 510/16 of the National Health Council, which regulates research with human beings [5], and all the subjects gave their informed consent.

Procedures

After completing an anamnesis providing identification, health, medication and training routine information, subjects underwent morphofunctional measurements such as anthropometric (weight, height and BMI) and physical tests (isometric handgrip strength and thoracolumbar flexibility). A digital balance (Incoterm®, 28010, Brazil) with capacity of 150 kg and resolution of 100 g was used to measure body weight and a metric tape (Fiber® Glass), accurate to 1 mm, to measure height. Both protocols followed specific standards [6]. Weight and height values were used to calculate and classify body mass index (BMI) according to the formula BMI = kg/m^2 [7]. The measure of isometric handgrip strength (IHS) was measured in kilograms of force using a handheld dynamometer (Jamar®, USA) according to standard procedure [8]. The sit and reach test using a Wells bench was applied to measure thoracolumbar flexibility, in line with specific standards [9].

Statistical analysis

Descriptive statistics were used and the values expressed as means and standard deviations (±). The anthropometric and motor indicators were analyzed using Pearson's linear correlation, after establishing normal distribution by applying the Shapiro-Wilk test. The significance level was set at $p<0.05$.

RESULTS

Estimation of indicators (arithmetic means and standard deviations) characterizing Marajoara wrestlers presents Table 1. The analysis revealed a positive correlation ($p<0.05$) between the motor indicator isometric grip strength and thoracolumbar flexibility (Figure 1).

Table 1. The general characteristic of male Marajoara wrestlers (n = 8).

Variable (indicator)	Value of the indicator Mean & SD
Age (years)	36.12 ±9.22
Weight (kg)	81.1 ±5.51
Height (cm)	171.62 ±4.41
BMI (kg/m^2)	27.62 ±2.85
Training experience (years)	19.25 ±11.56
Dominant handgrip strength (kgf)	59.06 ±10.63
Flexibility (cm)	33.25 ±8.40

DISCUSSION

Given that the objective of this study was to identify and analyze the anthropometric and motor data of Marajoara wrestlers in the search for possible performance indicators that characterize this modality, and in light of the difficulty in extracting parameters from other studies on the sport, we decided to compare the findings of this study with other grappling modalities, since some MW techniques are similar to those found in other martial arts, primarily throwing techniques.

Although this study did not aim to establish a correlation between athlete morphology and performance, this combination may be vital to the outcome of a match [10]. The set of grappling techniques that an athlete possesses may be associated with body structure, despite the fact that this indicator alone does not determine performance. As such, it is important to consider this information when planning the training of these athletes [10].

With respect to anthropometric indicators, the BMI of the athletes increased. Given the values established by the WHO [7], it was found that on average, athletes are categorized as overweight (BMI ≥25.0). This finding agrees with those of other combat sports. Campos et al. [10] and Lima et al. [11] reported similar values in judoists (26.86 ±6.43 and 25.61 ±2.19, respectively). Similar values were also found in practitioners of mixed martial arts (MMA) (27.85 ±3.42) [12]. Some studies obtained different BMI values. In young wrestlers, for example, BMI values were much lower (22.14 ±1.68) than

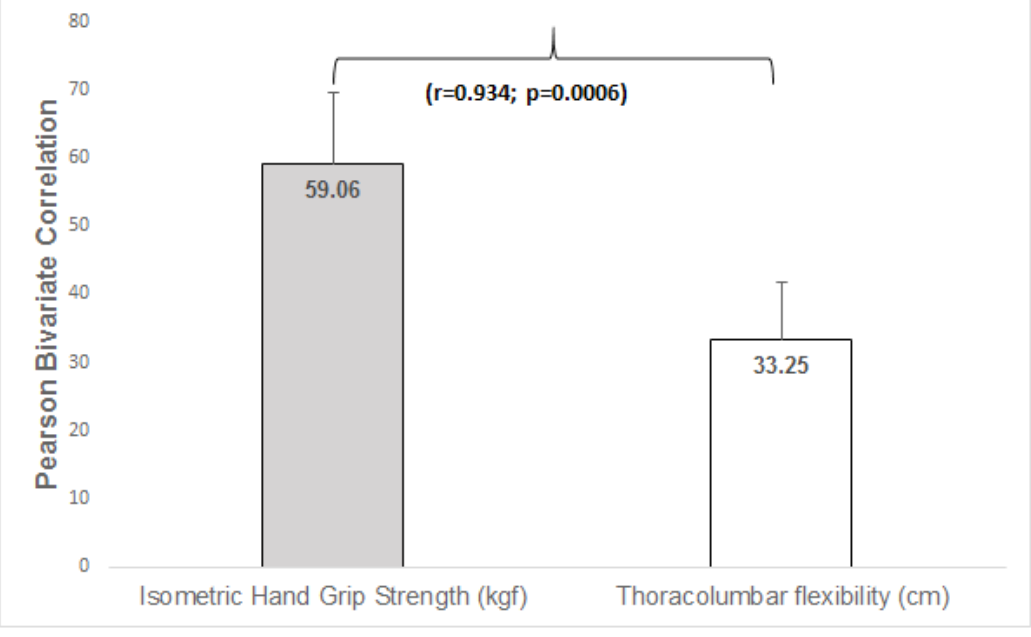

Figure 1. Correlation between the motor indicators of IHS and thoracolumbar flexibility in male Marajoara wrestlers (n = 8).

those observed here [13], as were those reported by Shariat et al. [14] in judoists (23.2 ±3.2). The daily demands imposed on the athletes of the present study as well as those of the sport itself justify these values, since most of the athletes investigated engage in daily pursuits such as cowhand, boatman and rural worker. Moreover, considering the average age and time engaged in the modality (19.25 ±11.56), it can be inferred that MW is part of the routine of the individuals investigated. This could also explain the morphological characteristic of the athletes, namely overweight associated with an increase in body weight not only from their fighting experience. On the other hand, athletes with different morphofunctional attributes may be related to the sport they practice and specialized training [12, 14].

Isometric handgrip strength (IHS), considered very good by Caballero et al. [15], is important in grappling events [16]. Given the need to maintain a defensive position or perform specific grappling movements to apply attack techniques in MW, the values obtained were relevant. In a study involving male judoists, IHS values were significantly lower than those reported here (49.84 ±3.63) [17]. Similarly, lower IHS values were obtained in studies on MMA fighters (57.77 ±5.97) [12] and judoists (43.83 kgf) [18]. Chaabene et al. [16] investigated elite wrestlers and found IHS values ranging from 38 to 63 kgf. A comparative study involving Leonese wrestling and judo obtained values of 58.00 ±1.69 kgf and 53.54 ±1.90, respectively [19].

The combination of high BMI and IHS values observed in this study is likely due not only to the performance of Marajoara wrestlers, but their primary occupation.

In regard to flexibility, the values of the present study are considered very good [20]. Similar flexibility results were found in a comparative study involving jiu-jitsu athletes (39.46 ±4.39) and MMA practitioners (35.20 ±10.11) [12], as well as judoists (34.16 ±6.93) [10]. As grappling modalities, both jiu-jitsu and judo require significant body movement, in the active and passive forms of muscle stretching [12].

Indeed, flexibility is necessary for the daily movements of individuals; however, given that MW is a grappling sport, it assumes major importance, since optimal flexibility levels may increase overall performance in these modalities [18]. Specifically in terms of the demands of MW, high flexibility and strength levels are needed due to the wide variety of grappling, spinning and throwing movements. The present study identified an association between the IHS and thoraco-lumbar flexibility. This corroborates the importance of IHS and trunk movements to perform a number of defensive and attack techniques during competition. In this respect, ample trunk rotation is necessary for adequate application of fighting techniques. Partial trunk flexibility limitations would compromise MW performance. As such, identifying associations between attributes is vital in any sport since they can be used to optimize the training of athletes in their respective modalities [14].

CONCLUSIONS

According to the data obtained, it can be concluded that: 1) this study is the first to describe a number of MW characteristics and establish IHS and thoracolumbar flexibility as strong performance indicators; 2) Marajoara wrestlers exhibit significantly higher IHS when compared to reference values and those of other grappling modalities; 3) Marajoara wrestlers display very good thoracolumbar flexibility when compared to reference values; 4) there is a strong statistical correlation between isometric grip strength and thoracolumbar flexibility.

In summary, the results presented here reveal a number of morphofunctional indicators in Marajoara wrestlers. We believe that this information can be incorporated into MW training programs. In addition, wrestlers, sports organizations and traditional populations from the Marajó Archipelago should benefit from the knowledge acquired here, given the growing concern with "sportifying" MW and its national and international recognition as a bona fide combat sport.

HIGHLIGHTS

Shows a little-known combat sport in the specialized literature.

Establishes a characterization of anthropometric and motor aspects in the fighters of a little-known combat sport.

Increase of information about physical performance aspects in the Marajoara wrestlers.

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