

# **NORMATIVE VALUES OF STRENGTH IN ADULTS AGED 18 TO 24 YEARS**

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## **ABSTRACT**

**Objective:** The study aims to outline normative values in Brazilians for handgrip strength of the right and left hands in adults of both sexes aged between 18 and 24 years. **Material and Methods:** Forty-one thousand, five hundred and ninety-one subjects were evaluated, with 23,931 women and 17,660 men, mean age  $21.33 \pm 1.99$  years, body mass  $69.38 \pm 15.97$  kg, and height  $168.5 \pm 9.2$  cm, respectively. They were submitted to handgrip strength testing with the hydraulic dynamometer "Force," provided by the company Tera Science, using secondary data supplied by the company. **Results:** The results show that women had  $24.24 \pm 5.44$  kgf in the left hand and  $25.99 \pm 5.56$  kgf in the right hand, while men had  $39.68 \pm 8.96$  kgf in the left hand and  $41.95 \pm 9.29$  kgf in the right hand, respectively. **Conclusion:** This work presented an initial contribution to normative values of handgrip strength in the Brazilian population aged between 18 and 24 years.

**Keywords:** Brazilian population; Strength; Dynamometry.

## **INTRODUCTION**

Handgrip strength is an essential indicator of muscular health and can reflect the overall health status of an individual (AMARAL et al., 2019). Studies have shown that handgrip strength is associated with several factors, such as body composition, bone mineral density (BMD), laboratory indicators (total cholesterol and triglycerides), better athletic performance, and even quality of life in different populations (BASSO, 2023; BENASSI et al., 2020; DAVEBIDA et al., 2022; SILVA et al., 2021). In addition, handgrip strength has been used as a parameter to assess overall muscular strength, being correlated with the strength of the lower and upper limbs (CASTRO, 2021; SANTOS et al., 2019; TAVARES et al., 2020).

Handgrip strength has been the subject of research in various populations (MUTALIB et al., 2024; WANG et al., 2018), of different ages (TAVARES et al., 2020), and between sexes (DODDS et al., 2022). However, there is no consensus on values for the Brazilian population, and studies do not have a robust sample that can demonstrate the real values of the population.

Finally, the normative values of a population are essential, allowing comparison and evaluation of the performance or condition of the individual in relation to the average of the population to which they belong (MUTALIB et al., 2024).

Therefore, the study aims to outline normative values in Brazilians for handgrip strength in the right and left hands in adults of both sexes aged between 18 and 24 years.

## METHODOLOGY

The present study is cross-sectional in nature, based on secondary data analysis, provided in partnership between the *Universidade Evangélica de Goiás* and the company Tera Science. The data ensured ethical guidelines and the integrity of the research, in addition to protecting the rights of the participants, who are identified only by numerical codes.

Handgrip Strength (FPM) data were measured with the Portable Digital Dynamometer Force in kilogram-force (kgf) with maximum capacity of 90 kgf. The Force device receives the data, which are sent via Bluetooth to the computer or cell phone screen, and its data are stored in the company's data clouds.

The sample was composed of 41,591 subjects, aged between 18 and 24 years. Of this total, 23,931 were women and 17,660 were men. In percentages, this represents 57.5% women and 42.5% men. A detailed description of ages and frequency is provided. Table 1 presents the quantity of subjects by sex, age, and dominant side of strength.

**Tabela 1.** Quantity of subjects by sex, age, and dominance; absolute frequencies and percentages.

		Frequencia absoluta (n)	Porcentagem (%)
Sexo	Feminino	23931	57,5%
	Masculino	17660	42,5%
	Total	41591	100,0%
Idade	18	4661	11,2%
	19	4883	11,7%
	20	5418	13,0%
	21	5862	14,1%
	22	6131	14,7%
	23	7006	16,8%
	24	7630	18,3%
	Total	41591	100,0%
Dominância	Esquerdo	3259	7,8%
	Direito	38332	92,2%
	Total	41591	100,0%

## RESULTS

The characteristics of the sample are presented in Table 2.

**Table 2.** Characterizations of subjects aged 18 to 24 years, mean and standard deviation.

Idade		Estatura		Massa Corporal	
Média	Desvio padrão	Média	Desvio padrão	Média	Desvio padrão
21	2	168,5	9,2	69,38	15,97

The characteristics of the sample and their respective handgrip strengths of the left and right hands, stratified by sex, are shown in Table 3.

**Table 3.** Characterization and stratification of left- and right-hand strength by sex.

		Estatura		Massa Corporal		Mão Esquerda		Mão Direita	
		Média	Desvio padrão	Média	Desvio padrão	Média	Desvio padrão	Média	Desvio padrão
sex	F	162,9	6,2	63,84	13,48	24,24	5,44	25,99	5,56
	M	176,0	7,0	76,89	16,02	39,68	8,96	41,95	9,29

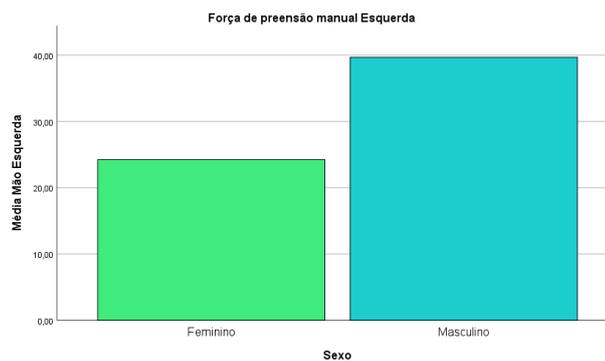
Results for left- and right-hand strength, with mean values and standard deviation, determining the reference values of the Brazilian population aged between 18 and 24 years, are shown in Table 4.

**Table 4.** Normative values of left- and right-hand strength for the Brazilian population aged 18 to 24 year.

		Mão Esquerda		Mão Direita	
		Média	Desvio padrão	Média	Desvio padrão
sex	F	24,24	5,44	25,99	5,56
	M	39,68	8,96	41,95	9,29

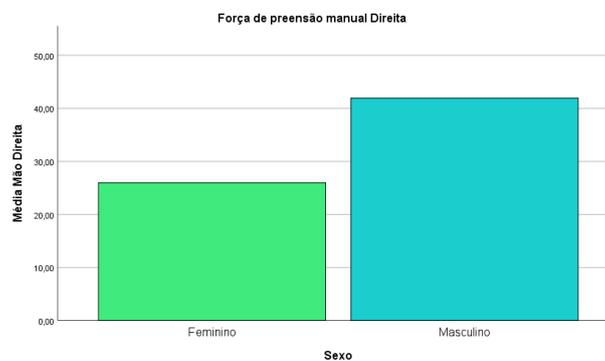
Next, the data are presented in graphs with the absolute results of left-hand strength by sex. See **Graph 1**.

**Graph 1.** Handgrip strength — left hand.



Finally, the data are presented in graphs with the absolute results of right-hand strength by sex. See Graph 1.

**Graph 1.** Handgrip strength — right hand..



## CONCLUSION

This study presented a contribution with normative values of FPM in the Brazilian population aged between 18 and 24 years, being relevant for health professionals, allowing them to compare and evaluate the performance or individual condition of the population to which the study belongs.

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