Assessment of Muscle Strength in Adults with Hemophilia from an Association of Patients in Brasília

Avaliação da Força Muscular em Adultos com Hemofilia de uma Associação de Pacientes em Brasília

Evaluación de la fuerza muscular en adultos con hemofilia de una asociación de pacientes en Brasilia

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RESUMO

Objetivo: avaliar a força muscular periférica em adultos portadores de hemofilia, por meio da dinamometria manual, e verificar a diferença da força muscular de acordo com a classificação de gravidade da hemofilia. **Método:** Participaram da pesquisa 20 homens divididos em 2 grupos, um com hemofílicos e um controle; foi aplicada uma ficha avaliativa seguida do teste de preensão palmar. **Resultados:** Quando comparados os dois grupos, foi observada diferença estatística significativa nas variáveis estatura (p=0,007) e força de preensão dos lados dominante (p=0,04) e não dominante (0,002), favorecendo o grupo controle; quando comparada a força de preensão dos hemofílicos com a doença leve e grave, houve diferença significativa para o lado não dominante (p=0,01). **Conclusão:** Pode-se associar a diminuição de força de preensão para o grupo de hemofílicos à sua condição de doença crônica hereditária. Entretanto, como o número de participantes foi pequeno, esses resultados sugestivos, mostram a necessidade de mais estudos sobre o tema.

Descritores: Hemofilia A; Hemofilia B; Força muscular; Hemartrose; Dinamômetro de força muscular.

ABSTRACT

Objective: to evaluate peripheral muscle strength in adults with hemophilia, through manual dynamometry, and to verify the difference in muscle strength according to the classification of hemophilia severity. **Method:** Twenty men participated in the research, divided into 2 groups, one with hemophiliacs and one control; an evaluation form was applied, followed by the handgrip test. **Results:** When the two groups were compared, a statistically significant difference was observed in the variables height (p=0.007) and grip strength of the dominant (p=0.04) and non-dominant (0.002) sides, favoring the control group; when comparing the grip strength of hemophiliacs with mild and severe disease, there was a significant difference for the non-dominant side (p=0.01). **Conclusion:** The decrease in grip strength for the group of hemophiliacs can be associated with their condition of hereditary chronic disease. However, as the number of participants was small, these suggestive results show the need for more studies on the subject.

Descriptors: Hemophilia A; Hemophilia B; Muscle Strength; Hemarthrosis; Muscle Strength Dynamometer.

RESUMEN

Objetivo: El objetivo del estudio fue evaluar la fuerza muscular periférica en adultos con hemofilia, mediante dinamometría manual, y verificar la diferencia en la fuerza muscular según la clasificación de severidad de la hemofilia. **Método:** Participaron de la investigación 20 hombres, divididos en 2 grupos, uno con hemofílicos y otro control; Se aplicó un formulario de evaluación, seguido de la prueba de agarre. **Resultados:** Al comparar los dos grupos, se observó una diferencia estadísticamente significativa en las variables altura (p = 0,007) y fuerza de agarre en los lados dominantes (p = 0,04) y no dominantes (0,002), favoreciendo al grupo control; al comparar la fuerza de agarre de los hemofílicos con la enfermedad leve y grave, hubo una diferencia significativa para el lado no dominante (p = 0,01). **Conclusión:** La disminución de la fuerza de prensión del grupo de hemofílicos puede estar asociada a su condición de enfermedad crónica hereditaria. Sin embargo, como el número de participantes fue pequeño, estos sugerentes resultados muestran la necesidad de más estudios sobre el tema.

Descriptores: Hemofilia A; Hemofilia B; Fuerza Muscular; Hemartrosis; Dinamómetro de Fuerza Muscular.

ORIGINAL

Introduction

Hemophilia is a hereditary coagulopathy, which is characterized by the deficiency of the coagulating activity of factor VIII (hemophilia A) or IX (hemophilia B). This disease is due to changes in the coding genes of these factors, which are located on the X chromosome. Therefore, its occurrence in males is almost exclusive, with women mostly only carriers, and generally asymptomatic.[1-3]

Its clinical classification is given by the severity of the disease, which is divided into mild, moderate and severe, depending on the activity of the coagulant factor.[2]

Intrarticular hemorrhages, called hemarthrosis, are one of the main clinical presentations of the disease, and cause pain, edema and immobility. The joint problems of hemophiliac patients begin in childhood, including recurrent hemarthrosis, chronic synovisis, flexion deformities, hypertrophy of growth epiphyses and damage to articular cartilage, resulting in hemophilic arthropathy.[4-11]

Hemophilic arthropathy is characterized by joint degeneration with the presence of loss of joint mobility and associated muscle weakness.[5] Muscle weakness is a problem that has a negative impact on both motor tasks and quality of life.[9] And studies indicate that it is a factor that limits the maintenance of an independent lifestyle.[12]

The evaluation of muscle strength can be done in several ways, including the strength test performed through palmar grip, which is easy to apply and does not need to use sophisticated equipment.[4] Several studies have already used the handgrip test in order to predict the general state of strength.[1] The measurement of handgrip strength using the Jamar hydraulic dynamometer is already considered "gold standard", due to the high validity and reliability that such instrument offers.[10]

Thus, the aim of the present study was to evaluate the muscle strength of the upper limbs in adults with hemophilia, through manual dynamometry.

Method

This was a quantitative, comparative and cross-sectional study conducted with 10 hemophiliac individuals (G1) linked to the Association of Volunteers, Researchers and Patients with Coagulopathy (HELP-C), who were present on the days of data collection and 10 male subjects without associated pathologies (G2), students of the Physiotherapy course at university center in Brazilia

The sample was selected in a non-probabilistic manner, for convenience. The collection referring to G1 was carried out in the premises of the Health Club, Brasília - DF, where the association holds social events; and the collection referring to G2 was carried out in the facilities of the university center between March and May 2019. The inclusion criteria for the hemophiliac group were: hemophiliac being male, aged over 18 years, being linked to HELP-C. In the control group, male participants, aged over 18 years, were students of the Physiotherapy course at university center in Brazilia and without any reported disease.

Regarding ethical care, help-c was first requested for formal authorization to carry out the research, and the study was forwarded to the Ethics Committee on Research with Human Beings (CEP) at university center in Brazilia through the Brazil platform, being approved by opinion 3,055,929. Only those who signed the free and informed consent form (TCLE) participated in the research. The subjects could terminate their participation at any time, if they wish, without any damages or losses to them; the participants' personal information was kept confidential, in the possession of the researchers, in order to preserve the confidentiality of the collected data.

For both groups, an evaluation form containing personal information was initially used, name, date of birth, age, naturalness, race/color, dominant side and for G1, clinical information such as the type of hemophilia and severity of the same was also requested.

After applying the evaluation form, the strength test was performed using a JAMAR ®. The participants were positioned seated with their feet resting on the ground, hips and knees at approximately 90° of flexion; the tested shoulder was adducted, in a neutral position for rotation, elbow ffleted at 90°, forearm in neutral position. The hand of the untested limb rested over the homolateral thigh. Three consecutive measurements were performed for the right hand intervald in 1 minute between each, followed by the same number of measurements in the left hand with the same time interval. She was then elected the largest measure obtained for each member. The relative strength was calculated by the ratio of absolute muscle strength (kg) by body mass (kg).

Subsequently, the data were tabulated in a Microsoft Excel spreadsheet, so that the data could then be transported to the SPSS 22.0 software, where the job statistic was rotated. First, the data were analyzed for the verification of possible missing cases, as well as outliers. To characterize the sample, we opted for the verification of the mean. The Kolmogorov-Smirnov test was used to evaluate data normality, considering a more robust test for this type of analysis, and then the Mann-Whitney U test was used to compare whether there was a statistically significant difference between hemophiliac and control groups. Considered a significant value of p less than or equal to 0.05.

Results and Discussion

Table 1 presents the sociodemographic data of the participants of the hemophiliac group. The participants were between 18 and 49 years old, being predominantly in the 30 to 39 years age group. Regarding the other variables, they show predominance: self-declaration of brown color, level of education, complete 2nd degree education, physical activity, hemophilia type A and, as for marital status, they declared to be mostly married (n=4) and single (n=4).

Table 1 - Sociodemographic information of participants with hemophilia. Brasilia, 2021.

Variable	Number
Age group	
18 to 29 years old	2
30 to 39 years old	5
40 to 49 years old	3
Auto color statement	
Brown	5
White	4
Black	1
Marital status	
Single	4
Married	4
Divorced	2
Degree of education	
Student	1
1st degree incomplete	1
1st degree complete	5
Complete 3rd degree	3
Physical activity	
Yes	7
No	3
Hemophilia type	
Type A	7
Type B	3

The sociodemographic data of the participants of the control group (G2), are presented in Table 2, which show a predominance of participants aged 18 to 29 years (n=7), self-declaration of brown color, single marital status, level of education 2nd complete degree and report performing physical activity.

Table 2 - Sociodemographic information of the control group participants. Brasilia, 2021.

Variable	Number
Age group	
18 to 29 years old	7
30 to 39 years old	3
Auto color statement	
Brown	5
White	4
Black	1
Marital status	
Single	9
Married	1
Degree of education	
Student	7
Complete 2nd degree	2
3rd degree incomplete	1
Physical activity	
Yes	7
No	3
Marital status	
Single	9
Married	1

Table 3 shows the values of anthropometric variables (age, weight, height, BMI) of G1 and G2 as well as the values of the grip test through dynamometry on the dominant and non-dominant side, and the relative strength of the dominant and non-dominant side, for groups G1 and G2.

Among the variables presented, there was a significant difference between the groups in the anthropometric variable height (p=0.007), presenting with a higher value in G2. Regarding anthropometric data, groups G1 and G2 were cohesive, and did not present significant differences between the anthropometric variables age, weight and BMI. Regarding the grip test, there was a significant difference in the dominant (p=0.04) and non-dominant (p=0.002) sides, presenting higher values in G2. Regarding the relative strength on the dominant and non-dominant sides, there was no statistically significant difference.

Table 3 - Results of the comparison between groups by the Mann-Whitney U test. Brasilia, 2021.

	Age	Weight	Height	BMI	Dominant Side Result	Non-Dominant Result	Relative force dominant side	Relative strength non-dominant side
Group 1	35	75,6	1,71	24,13	38,9	28,3	0,52	0,44
Group 2	26,6	84,3	1,80	25,74	48,4	47,6	0,59	0,59
P value	0,04*	0,21	0,007*	0,85	0,04*	0,002*	0,4	0,06

Legend: Group 1 = Hemophiliacs; Group 2 = Control; BMI = body mass index ; * = Significant difference.

Regarding the anthropometric variables height and age, there was a significant difference between groups G1 and G2, presenting higher values in group G1. Corroborating these findings, the one conducted by Mendes et al (2013) reports that age and height seem to be one of the factors most consistently associated with handgrip strength.[8]

Targino Junior et al. (2017) compared a group of hemophilics in relation to a control group, and found no significant difference in body mass index (P>0.05), which corroborates the finding in the present study, where weight and BMI were not significantly relevant when comparing the two groups.[13] However, the same study concluded that there was no relevant difference between the muscle strength of the hemophilic group and the control group, which contradicts the findings in this research. [13]

Although no relevant difference was observed between the relative strength of the hemophiliac group (G1) and the control group (G2), the results showed a significant difference in relation to the absolute strength of palmar grip; and these findings corroborate the results of the study by Jorge et al. (2019), which evaluated the muscle strength of adults in different age groups through manual dynamometry and noticed a decrease in values in the same proportion that increased the prevalence of chronic diseases.[6] Category in which hemophilia fits, since this disease is chronic hereditary in nature, where symptoms appear early, still in childhood.[7]

Conclusion

It is suggested that there is a decrease in grip strength for the hemophiliac group, which is associated with its condition of hereditary chronic disease, since other variables such as weight, BMI and relative strength did not show relevant results among the groups in this study.

However, as hemophilia is considered a rare coagulopathy, the scientific literature addressing handgrip strength and other anthropometric measures is scarce in this population, requiring further studies on the subject.

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