REVISTA BRASILEIRA DE REUMATOLOGIA

www.reumatologia.com.br

SOCIEDADE BRASILEIRA DE REUMATOLOGIA

Original article

Physical activity level and physical performance in the 6-minute walk test in women with fibromyalgia

Chris Andreissy Breda[a], *André Luiz Félix Rodacki*[a], *Neiva Leite*[b], *Diogo Homann*[b], *Suelen Meira Goes*[a,c], *Joice Mara Facco Stefanello*[c,*]

[a]*Centre for Motor Behaviour Studies (CECOM), Postgraduate Program in Physical Education (PPGEDF), Universidade Federal do Paraná (UFPR), Curitiba, PR, Brazil*

[b]*Research Nucleus on Quality of Life, PPGEDF, UFPR, Curitiba, PR, Brazil*

[c]*Psychophysiology of Exercise and Sport Research Laboratory, PPGEDF, UFPR, Curitiba, PR, Brazil*

ARTICLE INFO

Article history:
Received on 27 February, 2012
Accepted on 13 November, 2012

Keywords:
Chronic pain
Motor activity
Physical fitness
Walking

ABSTRACT

Introduction: Fibromyalgia (FM) is a chronic pain condition that causes impaired functional capacity, possibly through the adoption of sedentary behaviour. However, little is known regarding physical activity level and its relationship with physical performance in women with FM.

Objectives: To compare physical activity level, assessed using the International Physical Activity Questionnaire (IPAQ), and physical performance, measured using the six-minute walk test (6MWT), in women with and without FM and to examine the possible relationships between physical activity level and physical performance in both groups.

Methods: The study included 30 women diagnosed with FM (patients) and 28 healthy women (controls) who answered the IPAQ and performed the 6MWT.

Results: Patients and controls self-reported similar physical activity level, considering both the total score and all IPAQ subcomponents ($P > 0.05$). However, the FM patients had worse physical performance in the 6MWT (patients, 441.8 ± 84.1 m vs. controls, 523.9 ± 80.3 m; $P < 0.01$). There were no relationships between the distance walked in the 6MWT and the IPAQ variables for the control group. However, the distance walked by patients in the test showed a significant correlation ($P < 0.05$) with the total score and the subcomponents transport, household activities, and physical activities of moderate intensity in the IPAQ.

Conclusions: Women with FM had physical activity levels similar to women without FM but exhibited worse physical performance. This functional impairment may be related to the lifestyle adopted because there was a relationship between physical activity level and physical performance in those patients.

* *Corresponding author.*
E-mail: joice@ufpr.br (J.M.F. Stefanello).

0482-5004/$ - see front matter.

Nível de atividade física e desempenho físico no teste de caminhada de 6 minutos em mulheres com fibromialgia

Palavras-chave:
Dor crônica
Atividade motora
Aptidão física
Caminhada

RESUMO

Introdução: A fibromialgia (FM) é uma condição dolorosa crônica que causa comprometimento da capacidade funcional, possivelmente pela adoção de um comportamento sedentário. No entanto, pouco se sabe sobre o nível de atividade física (NAF) e sua relação com o desempenho físico em mulheres com FM.

Objetivos: Comparar o NAF, avaliado por meio do International Physical Activity Questionnaire (IPAQ), e o desempenho físico, mensurado pelo teste de caminhada de 6 minutos (TC6) de mulheres com e sem FM, além de investigar possíveis relações entre NAF e desempenho físico em ambos os grupos.

Métodos: Participaram do estudo 30 mulheres com o diagnóstico de FM (pacientes) e 28 mulheres saudáveis (controles) que responderam ao IPAQ e realizaram o TC6.

Resultados: Pacientes e controles autorrelataram similar NAF, considerando tanto o escore total quanto todos os subcomponentes do IPAQ (P > 0,05). Porém, as pacientes apresentaram pior desempenho físico no TC6 (pacientes: 441,8 ± 84,1 m vs. controles: 523,9 ± 80,3 m; P < 0,01). Não existiram relações entre a distância caminhada no TC6 e as variáveis do IPAQ para o grupo controle. Entretanto, para as pacientes, a distância caminhada no teste apresentou correlações significativas (P < 0,05) com o escore total e com os subcomponentes transporte, atividades domésticas e atividades físicas de intensidade moderada do questionário IPAQ.

Conclusões: Mulheres com FM apresentaram NAF similar às mulheres sem FM, mas pior desempenho físico. Esse comprometimento funcional pode estar relacionado ao estilo de vida adotado, uma vez que houve relação entre o NAF e o desempenho físico nessas pacientes.

Introduction

Fibromyalgia (FM) is a rheumatic condition characterised by chronic widespread pain and a reduced pain threshold; this condition predominantly affects women.[1] Some symptoms that are often associated with FM include fatigue, sleep disorders and various somatic symptoms, which manifest at different intensities in each patient.[2] Consequently, patients with FM commonly adopt sedentary behaviours, often resulting from fear caused by pain.

The increased pain intensity, associated with fear, indicates to patients that they should discontinue the physical activity[3] because it may compromise physical performance. Some studies have indicated that FM patients are less physically active than healthy individuals.[4] The reduced physical activity level and increased sedentary behaviour contribute to maintaining or worsening the manifestations observed in FM,[5,6] which may lead to a vicious cycle. Other impaired characteristics concern the patient's physical fitness. Physical inactivity, by itself, reduces certain physical/physiological parameters (muscle strength/endurance, aerobic capacity, flexibility), irrespective of the disease or aging process, and increases patient risk for physical disabilities.[7]

Several studies have shown that FM patients have reduced physical performance when evaluated by simple tests or more complex and specific tests.[8-12] However, simple and easily applied tests, which may be used as clinical parameters, must be performed to assess the effect of any intervention or to measure the functional condition. Therefore, the six-minute walk test (6MWT) is an option because it is a safe and inexpensive method[13] that shows good applicability, considering that it globally evaluates the integration of responses of all physiological systems involved during exercise.[14] Although the 6MWT has already been applied in previous studies involving FM patients with good reliability,[15,16] research studies aimed at examining the relationship between physical activity level and physical performance in those patients are scarce.

The present study aimed to compare the physical activity level and physical performance of women with and without FM and to examine the possible relationships between physical activity level and physical performance in both groups.

Methodology

This descriptive and comparative cross-sectional study was approved by the Human Research Ethics Committee of the Department of Health Sciences, Universidade Federal do Paraná (UFPR, Curitiba, PR, Brazil), following the guidelines proposed in resolution 196/96 of the Brazilian National Health Council on research studies involving humans (CEP/SD registration number: 1161.086.11.06).

A total of 34 women diagnosed with FM, according to the criteria from the American College of Rheumatology, participated in the study.[1] Recruitment occurred in two public hospitals of Curitiba, PR, Brazil. The patients were invited to participate in the study following examination by rheumatologists when meeting the following inclusion criteria: aged between 20 and 50 years and body mass index (BMI) between 18.5 and

39.9 kg/m². The exclusion criteria established were the following: heart diseases; untreated lung diseases; other rheumatic conditions; osteoporosis; severe musculoskeletal alterations; and the use of devices to perform their daily tasks. These data were gathered through self-reporting by study subjects and by monitoring their medical records. Four patients evaluated were excluded: three for not adequately filling in the IPAQ and one because she interrupted the 6MWT before completing the test. Thus, data from 30 patients were analysed. A total of 28 women who were university staff and did not have an FM diagnosis were invited to comprise the control group. The selection of the control group followed the same inclusion and exclusion criteria as the patients.

After signing the informed consent form, all study subjects underwent anthropometric assessments to measure the body mass (digital scale) and height (wall-mounted stadiometer), according to the Anthropometric Standardization Reference Manual,[17] to assess their BMI. Subsequently, they filled in the International Physical Activity Questionnaire (IPAQ), long version, aimed at estimating their usual physical activity level.[18] This tool generates data regarding the frequency and length of activities, considering the last seven days, and measures the physical activity level related to various types of activities (work, transport, household chores, leisure) or different intensities (walks and physical activities with moderate or vigorous intensity).

The physical performance of study subjects was measured using the 6MWT. The 6MWT was conducted in a 30-metre-long flat hallway, according to the American Thoracic Society guidelines.[14] Each study subject performed one test, and the distance walked was recorded in metres at the end of each test.

For the statistical analyses, the Shapiro-Wilk test was initially used to assess data normality, and the Levene test was used to assess the homogeneity of variances when comparing both groups. Pearson's correlation and independent t tests were used for parametric data, and the Spearman's Correlation and Mann-Whitney U test were used for non-parametric data. The data were analysed using the STATISTICA software (STATSOFT Inc., version 7.0). The level of significance was set at $P < 0.05$.

Results

Table 1 shows the general sample characteristics. The two groups were similar regarding age and BMI. A comparison of the physical activity level between the patients and the healthy controls is shown in Table 2. No significant differences were found for either overall physical activity level or the IPAQ subcomponents, indicating that the groups were similar with respect to active behaviour.

Fig. 1 shows that the distance covered while performing the 6MWT was significantly different between the groups; the patients had a worse physical performance than the control group.

Correlation analyses were performed, and no significant correlations were found in the patients for the variable distance in the 6MWT and the variables age ($r = –0.11$; $P = 0.54$) or BMI ($r = –0.21$; $P = 0.25$). The correlation analyses performed between the distances walked in the 6MWT and the variables related to physical activity are shown in Table 3. No significant correlations were found in the control group. However, there was a positive correlation in the FM group between the distance walked and the time spent on activities related to active walking as a means of commuting, household activities, activities that require moderate intensities and overall

Table 1 – Sample demographic and anthropometric characteristics.

	Controls (n = 28)	Patients (n = 30)	P
Age (years)	40.7 ± 6.3	42.6 ± 5.8	0.17
Body mass (kg)	70.6 ± 13.1	72.4 ± 9.3	0.67
Height (cm)	160.7 ± 6.3	158.9 ± 5.3	0.25
BMI (kg/m²)	27.2 ± 5.1	28.7 ± 3.9	0.21

BMI, body mass index.
The data are expressed as the mean ± standard deviation. The independent t test and the Mann-Whitney U test were used to compare the groups when the variables showed parametric and nonparametric distribution, respectively.

Table 2 – The comparison of the level of physical activity between patients and healthy controls.

	Controls (n = 28)			Patients (n = 30)			P
	Mean ± SD	Median	Min-Max	Mean ± SD	Median	Min-Max	
IPAQ (total)	710.5 ± 619.7	510.0	130-2865	677.8 ± 632.7	417.5	50-2270	0.15
Work	145.1 ± 239.3	45.0	0-825	58.6 ± 103.1	0.0	0-360	0.84
Transport	88.2 ± 85.7	55.0	0-350	71.8 ± 54.1	72.5	0-200	0.71
Domestic	435.5 ± 505.7	227.5	0-2040	489 ± 600.5	242.5	0-1920	0.55
Leisure	41.6 ± 74.6	0	0-285	58.3 ± 87.8	0	0-360	0.12
Walk	149.8 ± 97.0	150.0	15-530	130.3 ± 121.4	100.0	0-435	0.54
Moderate PA	552.5 ± 608.8	372.5	0-2640	519.5 ± 610.5	257.5	0-1920	0.62
Vigorous PA	8.2 ± 29.6	0	0-150	28 ± 73.9	0	0-360	0.60

PA, physical activity.
The data are expressed as the mean ± standard deviation, median and range (minimum and maximum). Adopted measuring unit = minutes/week. The total level of physical activity (total International Physical Activity Questionnaire, IPAQ) is generated by the sum of the subcomponents (work + transport + household + leisure) or the sum of the types of intensities (walking + moderate-intensity physical activity + vigorous-intensity physical activity). The independent t test and the Mann-Whitney U test were used to compare the groups when the variables showed parametric and nonparametric distribution, respectively.

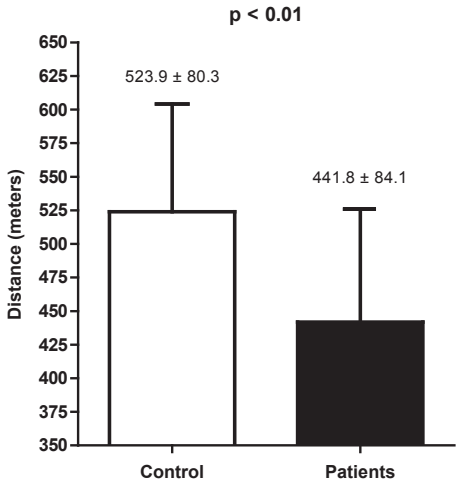

Fig. 1 – The physical performance of controls and patients in the 6MWT. An independent t test was used to compare the groups.

Table 3 – The correlation between distance walked in the 6MWT and physical activity level.

	Patients	Controls	Combined
IPAQ (total)	0.40*	0.36	0.37*
Work	0.24	0.01	0.21
Transport	0.38*	0.23	0.28*
Domestic	0.41*	0.16	0.28*
Leisure	0.04	0.33	0.10
Walk	0.26	0.20	0.28*
Moderate PA	0.42*	0.24	0.35*
Vigorous PA	0.13	0.24	0.10

PA, physical activity.
* Indicates a significant correlation at a level of $P < 0.05$. The correlations were performed for both groups assessed and combining both groups (controls + patients). Pearson's correlation and Spearman's correlation were used when variables showed parametric and nonparametric distribution, respectively.

physical activity level. The time spent on walks weekly also correlated better with performance in the 6MWT when the groups were combined.

Discussion

The ability to measure behaviour related to physical activity is especially useful for understanding the association between physical activity and health.[19] In patients with FM, such data are required to enable designing interventions best suited to that population. Although these patients are presumably less physically active, the quantification and characterization of physical activity in FM patients are scarce, and most studies are recent. The findings of the present study showed that patients and healthy controls did not differ with regard to their physical activity level when assessed using the IPAQ. While the results found in this study showed that the groups were similar with regard to the weekly time spent performing work, locomotion, in household and leisure activities and regarding the different intensities of physical activities, other studies[4,20] have found different results using both indirect methods to assess physical activity levels such as the IPAQ and direc methods such as accelerometers.

The misperceptions that FM patients may have when reporting retrospective information concerning the time spent and the type of activities performed in recent days are among the factors that may explain such differences.[4] The data reported by those patients are usually overestimated compared with the data gathered using accelerometers, indicating a lack of association between the indirect and direct measures of assessment of physical activity levels.[4,21] This suggests that self-reporting instruments fail to adequately capture the behaviour regarding physical activity in patients with FM.[4] Although it is not the only option available to assess the level of physical activity, self-reporting is a more practical and inexpensive means for that purpose. The use of accelerometers faces some challenges, mainly related to the technology and its application,[19] in addition to the cost of each unit, which limits their use. Pain intensity does not appear to be a limiting factor for the practice of physical activity because there is no apparent relation between pain and physical activity in those patients, despite differences in the literature on the comparison of physical activity levels between patients and healthy controls.[4] However, it should be noted that the measurement and quantification of physical activity levels in patients with FM is still little explored, which precludes further discussions on the topic.

Regardless of the method used to quantify physical activity levels, encouraging patients with FM towards regular physical activity has been essential. Considering that physical exercise as non-pharmacological treatment for that population[22] may help improve or maintain patients' physical condition, its regular practice may presumably provide a greater feeling of overall wellness[23] improving other symptoms associated with FM. Scientific evidence has shown the benefits, particularly of aerobic exercise on functional capacity and possibly on pain in FM.[24] Fontaine et al.[25] proposed a study in which FM patients were encouraged to increase the level of usual physical activity through several short sessions of moderate-intensity activities throughout the day, most days of the week, to improve FM symptoms. The intervention group reported decreased pain intensity compared with the control group (patients who were not encouraged to exercise). In the following study, the same researchers[26] showed that the benefits acquired from that program were not sustained over time because the intervention group significantly decreased their physical activity level a few months after the intervention. Recent evidence involving the evaluation of physical activity and the central nervous system mechanism responsible for the processing and modulation pain through magnetic resonance imaging suggests that patients who are physically active and avoid sustained periods of sedentary behaviour appear to more adequately retain this ability to modulate pain than those less active or who spend most of their time in sedentary activities.[6,20] These data indicate that the regular practice of physical activity is important to promote improvements in the manifestations observed in FM. The habit of adopting an active lifestyle is perceived and emphasised by the patients themselves. In a survey conducted online on the patients'

level of knowledge regarding the disease, the questions with the highest rates of correct answers addressed issues related to physical activity and/or exercise.[27]

The comparison of physical performance in both groups evaluated in the present study showed that the FM group had worse physical performance than the healthy control group. The distance walked during the 6MWT for patients and controls and the magnitude of the difference found between groups were similar to those found in other studies conducted in Brazil[28,29] and abroad.[30,31] Furthermore, both groups had similar age, BMI and physical activity levels, which indicates that those factors had no direct effect on the performance in the 6MWT in one group or the other. Conversely, Mannerkorpi et al.[32] found a direct relationship between the distance walked in the 6MWT and lower limb muscle strength in women with FM. Recently, Homann et al.[33] showed that women with FM report a greater pain intensity and perception of effort while performing the 6MWT than healthy women at all times during the test. Exacerbation of pain and effort, especially at the end of the test, was also identified in women with FM,[33] which indicates that those factors may limit performance in the 6MWT.

Various factors may presumably affect physical and functional capacity in certain conditions where there is health limitation including age, BMI, physical and psychological factors and specific characteristics of the disease. In the case of FM, the main manifestations observed and the disease severity show a relationship with physical performance compromise and the self-reporting of performing daily tasks.[11,34,35] However, behavioural factors that may be changed – including the effect of physical activity levels or a patient's status as sedentary, slightly or very active with respect to physical performance – are poorly addressed in FM patients.

In the present study, although women with and without FM exhibited no differences regarding the level of total physical activity and different types and intensities of activities performed, the group of patients with FM showed reduced physical performance. However, factors including age and BMI showed no significant correlations with the distance walked during the 6MWT for either patients or controls. Thus, those two variables, which often limit performance on 6MWT and are used in different equations to predict the distance walked, apparently do not limit the test performance. The analysis of possible relationships between physical activity levels and distance walked showed no significant correlations in the control group. However, significant correlations, from weak to moderate, were found in the FM patient group. These data suggest that the time spent weekly on physical activities including locomotion and household activities, activities requiring moderate intensities and the total level of physical activity may be related to physical performance in the 6MWT in patients with FM; that is, low performance in the 6MWT may be indicative of reduced physical activity levels. Jones et al.[34] also found that the level of physical activity affected the performance in the 6MWT in patients with FM.

The main limitation of the present study was the use of self-reported data to measure the level of physical activity. However, more refined and precise techniques remain an obstacle for that purpose. Furthermore, other conditions typical of FM, which could generate further data and establish more accurate relations on what was evaluated in the present study, were not evaluated.

In summary, the findings of the present study showed that women with FM self-reported physical activity levels similar to healthy women. However, the patients had worse physical performance in the 6MWT, which may have been affected by the physical activity levels because there were significant correlations for distance walked in the test with some types of activities and the total level of physical activity reported by those patients. This information may be useful when prescribing a treatment focused on maintaining and improving physical fitness to avoid progressive losses of physical function in patients with FM.

Acknowledgments

Thanks to the Brazilian Federal Agency for the Support and Evaluation of Graduate Education (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, CAPES) for granting the scholarships.

Ethics Committee

Human Research Ethics Committee of the Department of Health Sciences, Federal University of Paraná (Universidade Federal do Paraná, UFPR), Curitiba, Paraná. CEP/SD log number: 1161.086.11.06.

Funding

Brazilian Federal Agency for the Support and Evaluation of Graduate Education (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior, CAPES) for granting the scholarships.

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, et al. The American College of Rheumatology 1990. Criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee. Arthritis Rheum 1990;33(2):160-72.
2. Wolfe F, Clauw DJ, Fitzcharles MA, Goldenberg DL, Katz RS, Mease P, et al. The American College of Rheumatology preliminary diagnostic criteria for fibromyalgia and measurement of symptom severity. Arthritis Care Res (Hoboken) 2010;62(5):600-10.
3. de Gier M, Peters ML, Vlaeyen JW. Fear of pain, physical performance, and attentional processes in patients with fibromyalgia. Pain 2003;104(1-2):121-30.
4. McLoughlin MJ, Colbert LH, Stegner AJ, Cook DB. Are women with fibromyalgia less physically active than healthy women? Med Sci Sports Exerc 2011;43(5):905-12.

5. Munguía-Izquierdo D, Legaz-Arrese A. Determinants of sleep quality in middle-aged women with fibromyalgia syndrome. J Sleep Res 2011;21(1):73-9.
6. Ellingson LD, Shields MR, Stegner AJ, Cook DB. Physical activity, sustained sedentary behavior, and pain modulation in women with fibromyalgia. J Pain 2012;13(2):195-206.
7. Rikli RE, Jones CJ. Development and validation of a functional fitness test for community-residing older adults. J Aging Phys Activity 1999;7:129-61.
8. Valim V, Oliveira LM, Suda AL, Silva LE, Faro M, Neto TL, et al. Peak oxygen uptake and ventilatory anaerobic threshold in fibromyalgia. J Rheumatol 2002;29(2):353-7.
9. Henriksen M, Lund H, Christensen R, Jespersen A, Dreyer L, Bennett RM, et al. Relationships between the fibromyalgia impact questionnaire, tender point count and muscle strength in female patients with fibromyalgia: a cohort study. Arthritis Rheum 2009;61(6):732-9.
10. Jones KD, King LA, Mist SD, Bennett RM, Horak FB. Postural control deficits in people with fibromyalgia: a pilot study. Arthritis Res Ther 2011;13(4):R127.
11. Aparicio VA, Ortega FB, Heredia JM, Carbonell-Baeza A, Sjöström M, Delgado-Fernandez M. Handgrip strength test as a complementary tool in the assessment of fibromyalgia severity in women. Arch Phys Med Rehabil 2011;92(1):83-8.
12. Góes SM, Leite N, Shay BL, Homann D, Stefanello JM, Rodacki AL. Functional capacity, muscle strength and falls in women with fibromyalgia. Clin Biomech (Bristol, Avon) 2012;27(6):578-83.
13. Du H, Newton PJ, Salamonson Y, Carrieri-Kohlman VL, Davidson PM. A review of the six-minute walk test: its implication as a self-administered assessment tool. Eur J Cardiovasc Nurs 2009;8(1):2-8.
14. American Thoracic Society. ATS Statement: Guidelines for the Six-Minute Walk Test. Am J Respir Crit Care Med 2002;166(1):111-7.
15. Mannerkorpi K, Svantesson U, Carlsson J, Ekdahl C. Tests of functional limitations in fibromyalgia syndrome: a reliability study. Arthritis Care Res 1999;12(3):193-9.
16. Pankoff BA, Overend TJ, Lucy SD, White KP. Reliability of the six-minute walk test in people with fibromyalgia. Arthritis Care Res 2000;13(5):291-5.
17. Lohman TG, Roche AF, Martorel R. Anthropometrics standardization reference manual. Champaign: Human Kinetics Books; 1988.
18. Craig CL, Marshall AL, Sjostrom M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc 2003;35(8):1381-95.
19. Ward DS, Evenson KR, Vaughn A, Rodgers AB, Troiano RP. Accelerometer use in physical activity: best practices and research recommendations Med Sci Sports Exerc 2005;37(11 Suppl):S582-8.
20. McLoughlin MJ, Stegner AJ, Cook DB. The relationship between physical activity and brain responses to pain in fibromyalgia. J Pain 2011;12(6):640-51.
21. Kaleth AS, Ang DC, Chakr R, Tong Y. Validity and reliability of community health activities model program for seniors and shortform international physical activity questionnaire as physical assessment tools in patients with fibromyalgia. Disabil Rehabil 2010;32(5):353-9.
22. Heymann RE, Paiva E dos S, Helfenstein M Jr, Pollak DF, Martinez JE, Provenza JR, et al. Brazilian consensus on the treatment of fibromyalgia. Rev Bras Reumatol 2010;50(1):56-66.
23. Braz A de S, de Paula AP, Diniz M de F, de Almeida RN. Non-pharmacological therapy and complementary and alternative medicine in fibromyalgia. Rev Bras Reumatol 2011;51(3):269-82.
24. Thomas EN, Blotman F. Aerobic exercise in fibromyalgia: a practical review. Rheumatol Int 2010;30(9):1143-50.
25. Fontaine KR, Conn L, Clauw DJ. Effects of lifestyle physical activity on perceived symptoms and physical function in adults withfibromyalgia: results of a randomized trial. Arthritis Res Ther 2010;12(2):R55.
26. Fontaine KR, Conn L, Clauw DJ. Effects of lifestyle physical activity in adults with fibromyalgia: results at follow-up. J Clin Rheumatol 2011;17(2):64-8.
27. Moretti FA, Heymann RE, Marvulle V, Pollak DF, Riera R. Assessing knowledge on fibromyalgia among Internet users. Rev Bras Reumatol 2011;51(1):7-19.
28. Homann D, Goes SM, Timossi LS, Leite N. Avaliação da capacidade funcional de mulheres com fibromialgia: métodos diretos e autorrelatados [Assessment of functional capacity in women with fibromyalgia: direct and self-reported methods]. Rev Bras Cineantropom Desempenho Hum 2011;13(4):292-8.
29. Cardoso F de S, Curtolo M, Natour J, Lombardi Júnior I. Assessment of quality of life, muscle strength and functional capacity in women with fibromyalgia. Rev Bras Reumatol 2011;51(4):338-43, 349-50.
30. Ayán C, Martín V, Alonso-Cortés B, Alvarez MJ, Valencia M, Barrientos MJ. Relationship between aerobic fitness and quality of life in female fibromyalgia patients. Clin Rehabil 2007;21(12):1109-13.
31. Panton LB, Kingsley JD, Toole T, Cress ME, Abboud G, Sirithienthad P, et al. A comparison of physical functional performance and strength in women with fibromyalgia, age- and weight-matched controls, and older women who are healthy Phys Ther 2006;86(11):1479-88.
32. Mannerkorpi K, Svantesson U, Broberg C. Relationships between performance-based tests and patients' ratings of activity limitations, self-efficacy, and pain in fibromyalgia. Arch Phys Med Rehabil 2006;87(2):259-64.
33. Homann D, Stefanello JM, Góes SM, Leite N. Impaired functional capacity and exacerbation of pain and exertion during the 6-minute walk test in women with fibromyalgia. Rev Bras Fisioter 2011;15(6):474-80.
34. Jones CJ, Rutledge DN, Aquino J. Predictors of physical performance and functional ability in people 50+ with and without fibromyalgia. J Aging Phys Act 2010;18(3):353-68.
35. Homann D, Stefanello JMF, Goes SM, Breda CA, Paiva ES, Leite N. Stress perception and depressive symptoms: functionality and impact on the quality of life of women with fibromyalgia. Rev Bras Reumatol 2012;52(3):324-330.