Handgrip strength in men with fibromyalgia

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This study was in part financially supported by the Andalusia Institute of Sport, the Association of Fibromyalgia Patients of Granada (AGRAFIM), the Center of Initiatives for Cooperation and Development of the University of Granada (CICODE) and grants from the Spanish Ministry of Education (AP-2006-03676 and EX-2008-0641), Spanish Ministry of Science and Innovation (BES-2009-013442), the Swedish Council for Working Life and Social Research (FAS), and the Swedish Heart-Lung Foundation (20090635).

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Received on June 22, 2010; accepted in revised form on October 11, 2010.

Clin Exp Rheumatol 2010; 28 (Suppl. 63): S78-S81.

Key words: fibromyalgia, men, handgrip strength, FIQ

Competing interests: none declared.

ABSTRACT

Objective. *To examine the association of muscular strength, as measured by handgrip strength test (HGs), with the presence/absence of fibromyalgia (FM) and FM severity in men.*

Methods. *A total of 20 men (age, (mean age±standard deviation) of 48.0±8.0 years) with FM and 60 healthy subjects (age, 49.5±7.3 years) participated in the study. The HGs was measured by a maximal isometric test using a dynamometer with adjustable grip in both hands, and the average score was used in the analysis. All FM patients completed the Spanish version of the Fibromyalgia Impact Questionnaire (FIQ). Patients were classified as having moderate FM if the FIQ was <70 and as having severe FM if the FIQ was ≥70.*

Results. *HGs was ~17% lower in FM patients compared to healthy men (p=0.005) and ~27% lower in men with severe FM compared to those with moderate FM (p=0.03). Age-adjusted logistic regression models showed that 1 kilogram increment in HGs was associated with an 8% reduced risk of having FM (OR=0.92, 95% CI: 0.86-0.97, p=0.002). In the FM group, 1 kilogram increment in HGs was associated with a 13% reduced risk for having severe FM (OR=0.87, 95% CI: 0.76-0.99, p=0.04). HGs was negatively associated with pain, fatigue, stiffness and with the total score from the FIQ (all p<0.05).*

Conclusion. *HGs is reduced in male FM patients and is inversely related to FM severity and symptomatology. HGs testing could be used as a complementary tool in the assessment and monitoring of FM. Further research on male FM patients is needed to confirm or contrast these findings.*

Introduction

Fibromyalgia (FM) is a disorder characterised by the concurrent existence of chronic, widespread musculoskeletal pain and multiple sites of tenderness (1). FM symptomatology greatly differs among patients, but commonly includes pain, morning stiffness, fatigue, insomnia-related symptoms, and concentration and memory difficulties (1-3). FM has an enormous impact on the quality of life of patients (4), and the mental health of patients with FM has been suggested to be worse than that from other diseases characterised by pain such as rheumatoid arthritis (5). In Spain, the prevalence of FM is ~2.4% (6) and is dramatically more common in women (~4.2%) than in men (~0.2%) (6). However, there is a greater proportion of men diagnosed with FM on sick leave, compared to women with the same diagnosis (7). Men also have a worse perception of their health, a higher percentage of psychiatric history and current mental illness, and more impact from the disease (7). Men with FM report more severe symptoms than women, decreased physical function, and lower quality of life (7-8).

Muscular strength, as assessed by handgrip strength (HGs), is a predictor of functional capacity, morbidity and mortality (9-10). HGs is a quick and easy muscular fitness test that provides useful information about overall muscular strength. Several studies have observed lower muscular strength, as measured by HGs, in female FM patients compared with healthy women (11-12). Mannerkopi *et al.* (13) suggested that muscular fitness testing (specially the HGs test) could be a complementary tool to be used in clinical settings when planning treatment for FM patients. However, most of studies were conducted in women (11-13), and little is known about muscular fitness and FM in the male population. Since muscular fitness is a good marker of functional capacity and health, to explore the association between HGs and FM in men is of clinical and social relevance.

The present study aimed to examine the associations of muscular strength, as measured by HGs, with the presence/absence of FM and FM severity in men.

Methods

Study sample

The study comprised 20 men aged (mean±standard deviation) 48.0±8.0 years (range: 37 to 63 years) who were diagnosed with FM by a rheumatologist and met the American College of Rheumatology criteria for FM (1). Exclusion criteria included having other rheumatic diseases and/or severe somatic or psychiatric disorders, such as cancer, severe coronary disease, or schizophrenia. A group of 60 healthy aged-matched men (mean 49.5±7.3 years) also volunteered to participate in the study. All participants signed a written informed consent to participate in the investigation. The study was reviewed and approved by the Ethics Committee of the "Hospital Virgen de las Nieves" (Granada, Spain).

Material and procedures

Handgrip strength was assessed using a hand dynamometer with adjustable grip (TKK 5101 Grip D; Takey, Tokio Japan). The participant squeezes gradually and continuously for at least two seconds, performing the test with the right and left hand in turn, using the optimal grip-span. Optimal grip span was set at 5.5cm, according to Ruiz-Ruiz *et al*.(14). Each patient performed two attempts with each hand, with the arm fully extended, forming an angle of 30° with respect to the trunk. The maximum score in kilograms for each hand was recorded and the mean score of left and right hand was used in the analyses.

Anthropometric assessment

Weight (kg) and height (cm) were measured using standard procedures and body mass index (BMI) was calculated as weight (in kilograms) divided by height (in meters) squared and categorised using the international criteria: underweight (<18.5kg/m^2), normal weight (18.5–24.99kg/m^2), overweight (25.0–29.99kg/m^2) and obese (≥30.0kg/m^2).

Table I. Physical characteristics of the study sample.

	Presence/absence of FM			FM severity		
	Healthy men (n=60)	FM patients (n=20)	*p*	Moderate FM (n=7)	Severe FM (n=13)	*p*
Age (years)	49.5 (7.3)	48.0 (8.0)	0.45	46.0 (8.7)	49.1 (7.8)	0.43
Height (m)	173.6 (6.5)	173.1 (6.3)	0.69	172.9 (4.4)	173.3 (7.0)	0.90
Weight (kg)	81.0 (13.6)	81.8 (8.9)	0.85	83.2 (4.5)	81.9 (10.7)	0.61
BMI (kg/m^2)	26.8 (3.5)	27.3 (2.8)	0.60	27.9 (2.3)	26.9 (3.1)	0.50
Weight status (%) UW/NW/OW/OB	0/30/58/12	0/25/60/15	0.87	0/31/54/15	0/15/71/14	0.69

Values are means (standard deviation), unless otherwise stated.
FM: fibromyalgia; BMI, Body Mass Index; UW, underweight (BMI<18.5kg/m^2); NW, normal weight (BMI: 18.5–24.99kg/m^2); OW, overweight (BMI: 25.0–29.99 kg/m^2); OB, obese (BMI>30.0kg/m^2).

The Spanish version of the Fibromyalgia Impact Questionnaire (FIQ) was used to assess FM-related symptoms and mood (15). The FIQ assesses the components of health status that are believed to be most affected by FM. It is composed of ten dimensions: physical impairment, overall well being, work missed and seven items using a visual analogue scale in which the patient rates job difficulty, pain, fatigue, morning tiredness, stiffness, anxiety and depression. The FIQ score ranges from 0 to 100 with a higher value indicating a greater impact of the disorder. The FM patients were classified as having moderate FM if their score in the FIQ was below 70 and as having severe FM if the FIQ was greater or equal to 70 (16).

Statistical analysis

The distribution of the data was examined for all study variables. The FIQ variables showed a non-normal distribution which could not be normalised after several transformations (*e.g.* logarithmical and squared root transformations). Anthropometric parameters and HGs showed an acceptable normal distribution. Comparisons between men with and without FM, and between men with moderate and severe FM were performed using *t*-tests or Chi-squared tests, as appropriate. Binary logistic regression was used to further study the relationship between HGs and presence/absence of FM, or FM severity (moderate and severe), after adjustment for age. Spearman correlation coefficients were used to examine the relationships of HGs with FIQ dimensions. All analyses were performed using the Statistical Package for Social Sciences (SPSS, version 16.0 for Windows; SPSS Inc., Chicago, IL), and the level of significance was set at 0.05.

Results

Physical characteristics of the study sample stratified by presence/absence of FM and FM severity are presented in Table I. No differences were observed in age, weight, height, BMI or weight status categories among the study groups. HGs was ~17% lower in FM patients than in their healthy peers (32.9±10.4kg *vs*. 39.8±8.9kg, p=0.005) and ~27% lower in men with severe FM than in those with moderate FM (29.2±8.7kg *vs*. 39.8±10.4kg, p=0.03) (Fig. 1). Similar HGs levels were observed in healthy men and patients with moderate FM. In the FM group, the mean total score of FIQ was 74.7(15.2) and 65% of the patients had severe FM (FIQ≥70) (data not shown). The findings did not change after further adjusting for age and anthropometric variables.

Spearman correlations between HGs and FIQ dimensions are shown in Table II. HGs was negatively associated with the FIQ dimensions of pain (p=0.03), fatigue (p=0.02), stiffness (p=0.05) and the total score on the FIQ (p=0.01).

Binary logistic regression analyses (data not shown), indicated that 1 kilogram increment in HGs was associated with an 8% reduced risk of having FM (OR=0.92, 95% CI: 0.86–0.97, p=0.002). In the FM group, 1 kilogram increment in HGs was associated with a 13% reduced risk for having severe FM (OR=0.87, 95% CI: 0.76-0.99, p=0.04).

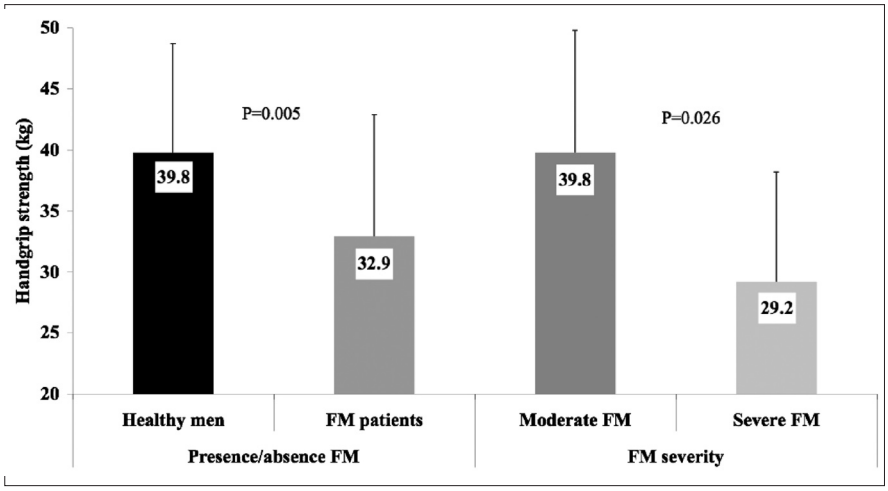

Fig. 1. Handgrip strength (mean value of both hands in kilograms) in men with or without fibromyalgia (FM), and in men with moderate (Fibromyalgia Impact Questionnaire, FIQ<70) or severe (FIQ≥70) FM.

Table II. Spearman correlations (rho) of handgrip strength with Fibromyalgia Impact Questionnaire (FIQ) dimensions and FIQ total score in male fibromyalgia patients (n=20).

	Handgrip strength	
	rho	*p*
Physical impairment	-0.31	0.19
Job difficulty	-0.44	0.08
Pain	-0.48	0.03
Fatigue	-0.51	0.02
Morning tiredness	-0.28	0.24
Stiffness	-0.45	0.05
Anxiety	-0.40	0.09
Depression	-0.40	0.09
Total score FIQ	-0.55	0.01

Discussion

The present study shows that HGs is reduced in male FM patients compared to healthy men and in patients with severe FM compared to those with moderate FM. Of note is that the level of HGs in healthy men and patients with moderate FM were similar, so the lower HGs levels observed in the FM patients compared to the healthy group was due to the very low level of HGs in severe FM patients. Furthermore, HGs in male FM patients was inversely related to FM symptomatology, particularly pain, stiffness, fatigue and total FM impact score. The risk of having FM was reduced by 8% with every kilogram increment in HGs. Likewise, the risk of severe FM, compared with moderate FM, was reduced by 13% with every kilogram increment in HGs. To the best of our knowledge, the relationship of HGs with presence/absence of FM and FM severity in men has not been previously explored. Although these findings should be replicated in future studies with larger sample sizes and in different age groups and ethnicities, the present findings are promising and support the usefulness of HGs testing as complementary information in the diagnosis of FM and degree of severity of the disorder in men.

Since we did not find any studies examining muscular fitness in men with FM, we can only compare our results with those from other studies conducted in female FM patients. Our findings concur with other studies that reported lower levels of HGs in female FM patients (11-12) compared to healthy women. Nordenskiöldl and Grimby (11) assessed HGs in 14 Swedish FM patients and 18 healthy women using the "Grippit instrument". They observed that HGs was 40% lower in FM patients compared to healthy women. Sahin *et al*. (12) studied 41 Turkish women with FM and compared them with 40 age- and BMI-matched healthy females, and observed significantly lower values of HGs (measured with Jamar dynamometer) in the FM group. Most of the investigations reported lower levels of HGs in female FM patients than in healthy women (11-12), and only one study failed to find significant differences between groups (17).

A major finding of the present study is that men with severe FM have lower HGs than men with moderate FM. Henriksen *et al*. (18) reported no associations between muscular strength levels, as measured by isokinetic knee extension and flexion, and FM symptomatology in 840 female FM patients from Denmark. In contrast, Mannerkorpi *et al*. (13) observed that higher levels of HGs were related to higher physical functioning and lower pain in 69 female FM patients from Sweden. Our data also suggest that high levels of HGs in male FM patients are related to more favourable levels of pain, fatigue, morning stiffness and total FM impact score.

The cut-off point from FIQ (*i.e*. ≥70) has been suggested in the field of FM to differentiate between moderately and severely afflicted FM patients (16). However, such cut-off point should be validated using different methods to assess the severity of FM. The present study, performed in a relatively small sample of men with FM, should stimulate further research on this topic, particularly in male FM patients.

Conclusion

The fact that HGs is reduced in male FM patients and is inversely related with FM severity, suggests that HGs testing could be used as a complementary tool in the assessment and monitoring of FM. HGs assessment is relatively cheap, easy to perform and low-time consuming which makes its use in the clinical setting feasible. Further research on male FM patients is needed to confirm or contrast the present findings.

Acknowledgments

The authors gratefully acknowledge all the participants for their collabo-

ration. We also acknowledge all the AGRAFIM (FM association from Granada, Spain) members involved in the field work for their efforts and great enthusiasm.

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