Journal of Crohn's and Colitis (2014) 8, 529–535

Available online at www.sciencedirect.com

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Lower extremity mobility limitation and impaired muscle function in women with ulcerative colitis☆,☆☆

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Received 19 September 2013; received in revised form 6 November 2013; accepted 8 November 2013

KEYWORDS
Ulcerative colitis;
Muscle function;
Physical performance;
Body composition

Abstract

Background and aim: Fatigue, weakness and musculoskeletal manifestations are associated with IBD. An impaired nutritional status and a reduced physical activity can contribute to these clinical outcomes, impacting quality of life and increasing disability. This study aims to assess muscle strength and lower limb physical performance in female UC patients, taking into consideration disease activity, body composition and habitual physical activity.
Methods: A case-control study was performed including 23 UC female outpatients and 23 age- and BMI-matched healthy women as controls. Quadriceps strength (QS), handgrip strength (HGS), physical performance based measures (five repetitions sit-up test and 4 meter gait speed test), body composition (bioelectrical impedance analysis, anthropometry), and habitual physical activity (HPA) levels were assessed.

☆ Author contributions: Cyrla Zaltman was involved in study design, editing the manuscript and provided financial support for this work. Valeria B. Braulio made all statistical analyses and was involved in editing the manuscript. Rosângela Outeiral provided the collection of all human materials and made the physical evaluation. Carmen Lúcia Natividade de Castro was involved in coordinating and designing of the study. Tiago Nunes made a critical review of the manuscript and was involved in writing the final draft.
☆☆ Supported by: Fundação de Amparo a Pesquisa do Estado do Rio de Janeiro — FAPERJ.
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1873-9946/$ - see front matter
http://dx.doi.org/10.1016/j.crohns.2013.11.006

Results: UC group had decreased QS (−6%; *P* = 0.012), slower sit-up test (−32%; *P* = 0.000), slower gait speed (−17% P = 0.002) and decreased HPA level (−30%, *P* = 0.001) compared with controls. No difference in HGS was observed between groups. Logistic regression showed that UC was an independent factor for decreased QS and slower sit-up test, while HPA was a protective factor for impaired gait speed. Multivariate linear regression showed that BMI was independently associated with an improved QS and slower sit-up test in the UC group.
Conclusion: Women with UC had decreased lower limb strength and mobility limitations, which were associated with BMI and the level of physical activity. Early evaluation of nutritional status and performance of the lower limbs could identify UC patients with pre-clinical disability who may benefit from earlier health lifestyle modifications.

1. Introduction

Ulcerative colitis (UC) is a chronic inflammatory bowel disease that affects segments of colonic and rectal mucosa in a continuous pattern. UC has an intermittent disease course with periods of exacerbated symptoms, and periods that are relatively symptom-free.[1] The clinical presentation depends on the extent and severity of the intestinal involvement and the presence of extra-intestinal manifestations.[2]

Even though, UC patients often complain of musculoskeletal symptoms, muscle weakness is one of the least understood extra-intestinal manifestations associated with inflammatory bowel diseases (IBD). In this regard, very few studies have investigated the involvement of peripheral muscle function in IBD patients. Most of the available data, however, show contradictory results. Geerling et al.,[3] for instance, examined the lower limb muscle strength in 30 UC patients of both genders and reported no significant differences in hamstrings or quadriceps strength in comparison with age- and sex-matched controls. In contrast, Valentini et al.[1] found significant reduction in handgrip strength (HGS) in 50 UC patients compared with controls. More recently, Werkstetter et al.[4] detected preserved HGS, but only in female UC patients. Importantly, even though upper and lower limb functions are both central components of daily living tasks, there are currently no studies evaluating the physical performance of the lower limbs in patients with UC.

The present study, therefore, aims to reassess the upper and lower limb muscle strength in patients with UC compared with age, gender and body mass index (BMI)-matched healthy individuals. In addition, performance-based measures of mobility and the overall physical activity were also evaluated.

2. Subjects and methods

2.1. Ethical considerations

The study protocol was approved by the Ethical Committee of the University Hospital of the Federal University of Rio de Janeiro (HUCFF-UFRJ), and informed consents were obtained from all subjects.

2.1.1. Study design and the studied population

A case-control study including UC female patients and BMI and age-matched healthy women was designed. Patients and controls were recruited at the gastroenterology outpatient clinic of the HUCFF-UFRJ. UC Patients had an established diagnosis by standard clinical, radiological, histological, and endoscopic criteria.[5,6] The matched controls were recruited among healthy patient's relatives and hospital staff.

All subjects were above 18 and below 65 years of age, non-smokers and had a sedentary life style, which was defined as the absence of a programmed physical activity ($\geq$30 min) on most days of the week.[7] Patients and controls with any chronic disease (even under medical treatment), previous total colectomy or ileostomy, current pregnancy or breastfeeding, and those with muscle and joint abnormalities (which could limit the practice of physical activity) were excluded. Subjects with less than 3 years of school or those who were, for any reason, unable to read, understand, or answer questionnaires were also excluded. A complete blood analysis was performed in all subjects and the presence of hemoglobin levels below 12 g/dL was also considered an exclusion criterion. All subjects exhibited normal plasma albumin levels (4.2 ± 3.4 g/dL).

Disease activity was assessed according to the partial Mayo score.[8] Disease location, phenotype and age of disease diagnosis were determined according to the Montreal Classification.[9]

2.2. Body composition

Body composition was assessed using anthropometry and bioelectrical impedance analysis (BIA). Subjects were studied at least 4 h after their last meal, and had emptied their bladders before their body weight and height were recorded. BIA was undertaken with a tetrapolar bioanalyzer device (Model 310, Biodynamics Corp, Seattle, WA-USA). Measurements were undertaken as previously described.[10] BMI was calculated as weight (kg) divided by squared height (meters). Subjects were classified as underweight (BMI $<$ 18.50 kg/m^2), normal weight (BMI = 18.50–24.99 kg/m^2), overweight (BMI $\geq$ 25.00 kg/m^2) or obese (BMI $\geq$ 30.00 kg/m^2), according to the World Health Organization.[11] Fat-free mass (FFM) and fat mass (FM) were calculated from the measurements of resistance made at 50 kHz using the formula provided by the instrument manufacturer. In addition, the resistance directly read from the impedance device was considered along with height, weight, and age in the obesity-specific equation published by Segal et al.[12] The FFM index (FFMI) was derived as FFM (kg) divided by height (m) squared (kg/m^2).