



BLIND, CROSS-SECTIONAL STUDY

# Abdominal muscle strength is related to the quality of life among older adults with lumbar osteoarthritis



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## KEYWORDS

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**Summary** The aim of the present study was to determine the association between abdominal muscle strength and quality of life among older adults with lumbar osteoarthritis. A blind, cross-sectional study was conducted involving 40 older adults: 20 with lumbar osteoarthritis (12 women and 8 men, mean age of  $65.90 \pm 4.80$  years) and 20 controls (14 women and 6 men, mean age of  $67.90 \pm 4.60$  years). The volunteers were submitted to an abdominal muscle strength test. Quality of life was evaluated using the SF-36 questionnaire. Both abdominal muscle strength and quality of life scores were significantly lower in the group with lumbar osteoarthritis in comparison to the controls ( $p < 0.05$ ). Moreover, significant and positive associations were found between abdominal muscle strength and the subscales of the SF-36 questionnaire ( $p < 0.05$ ,  $0.421 \geq rs \leq 0.694$ ). Based on the present findings, older adults with lumbar osteoarthritis with greater abdominal muscle strength have a better quality of life. © 2014 Elsevier Ltd. All rights reserved.

## Introduction

The ageing process predisposes individuals to the development of a set of chronic degenerative diseases, which commonly affect mobility (Aigner et al., 2004; Vo et al., 2013). Osteoarthritis is a prevalent, debilitating condition among older adults (Aigner et al., 2004) and is

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characterized by the degeneration of joint cartilage, with the occurrence of inflammation and alterations in both the area surrounding the joint and subchondral bone (Goldring and Goldring, 2007).

Osteoarthritis mainly affects the hips, knees, hands, feet and spinal column (Woolf and Pfleger, 2003). Clinically, this condition is characterized by joint pain, limited range of motion, crepitation, local inflammation and joint effusion, often associated with significant functional disability (Woolf and Pfleger, 2003; Aigner et al., 2004; Goldring and Goldring, 2007). A number of factors contribute to the progression of joint degeneration and the aggravation of complaints among patients with osteoarthritis, such as the ageing process, joint instability and muscle weakness (Goldring and Goldring, 2007).

Muscle fitness is of considerable importance to individuals with lumbar osteoarthritis. In this clinical condition, the abdominal muscles play a key role in stabilizing the lumbar spine (Barr et al., 2005, 2007) and can slow the progression of joint degeneration (Goldring and Goldring, 2007; Cvijetić et al., 2011). Indeed, a number of clinical trials have investigated the effect of strengthening the abdominal muscles with the aim of reducing low back pain (Kumar et al., 2009; França et al., 2010; Moon et al., 2013). However, few studies in the scientific literature have evaluated the association between muscle strength and multidimensional variables in individuals with spinal column degeneration.

The aim of the present study was to determine the association between abdominal muscle strength and quality of life among older adults with lumbar osteoarthritis. The hypothesis is that a positive association exists between these variables.

## Methods

### Study design

A blind, cross-sectional study was carried out. One physiotherapist performed the screening of the volunteers with and without lumbar osteoarthritis. Another physiotherapist performed the measures of abdominal muscle strength and pain intensity. A third administered the 36-Item Short Form Health Survey (SF-36). A fourth physiotherapist was in charge of the data processing and statistical analysis.

This study received approval from the Human Research Ethics Committee of the São Paulo State University (Marília, SP, Brazil) under process number 1277/2009. The volunteers received information on the objectives and procedures and agreed to participate by signing a statement of informed consent.

### Sample

Forty older adults, 20 with lumbar osteoarthritis (12 women and 8 men, mean age of  $65.90 \pm 4.80$  years) and 20 controls (14 women and 6 men, mean age of  $67.90 \pm 4.60$  years) were consecutively recruited through verbal invitations in the communities of the city of Marília (SP, Brazil). The absence/presence of lumbar osteoarthritis was determined by a medical report (presence of pain and joint stiffness) and a radiographic examination.

The following were the exclusion criteria: age less than 60 years; regular practice of physical activity (at least twice a week); adverse health conditions that could influence of the results of the tests (heart disease, lung disease, systemic arterial hypertension, cognitive impairment, malignant tumor or fracture); diagnosis of spondylothesis, degenerative discs and/or facet capsule irritation; current medicinal therapy or physical therapy that could influence the results.

### Evaluation of abdominal muscle strength

The test proposed by Kendall et al. (1993) was used to evaluate abdominal muscle strength. The examiner in charge of the test had undergone a training exercise. The volunteer was positioned in the supine position on a flat surface with arms crossed over the thorax. The examiner assisted in the elevation of the lower limbs until reaching the vertical position with the knees extended. The volunteer was thus positioned with the hips flexed at  $90^\circ$  and instructed to incline the pelvis in the posterior direction to rectify lumbar spine on the surface through the contraction of the abdominal muscles. The volunteer was then instructed to maintain the lumbar region flat while slowly lowering the legs. The volunteer did not elevate his/her head or shoulders during the test.

During the lowering of the legs, the examiner detected the moment at which the anterior inclination of the pelvis and arching of the lumbar region occurred. At this moment, the movement was stopped and the angle between the extended legs and floor was measured with the aid of a universal goniometer (CARCI, São Paulo, SP, Brazil). The scoring of muscle strength was based on this angle, with angles closer to  $0^\circ$  indicative of greater muscle strength:  $0 \geq 15^\circ$  (score of 10),  $15 \geq 30^\circ$  (score of 9),  $30 \geq 45^\circ$  (score of 8),  $45 \geq 60^\circ$  (score of 7),  $60 \geq 75^\circ$  (score of 6) and  $75 \geq 90^\circ$  (score of 5).

### Quality of life assessment

The SF-36 was used for the assessment of quality of life. This questionnaire has been translated and validated for use on the Brazilian population and is composed of items divided among eight subscales: physical functioning, physical role functioning, emotional role functioning, bodily pain, general health state, vitality, social role functioning, and mental health. The final score of each subscale ranges from 0 (worst quality of life) to 100 (best quality of life) (Ciconelli et al., 1999).

### Evaluation of pain intensity

A visual analog scale (VAS) was employed to evaluate pain intensity in the lumbar region. This scale is easy to administer and consists of a straight line measuring 10 cm in length, with "absence of pain" written at one end and "worst pain ever felt" written at the other end. The volunteer was instructed to make a perpendicular line between the two extremes that represented the pain level he/she was feeling at the time (Ferreira-Valente et al., 2011).

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