

## ARTIGO ORIGINAL

# Efeitos de um programa de exercícios em indivíduos com dor lombar crônica

## *Effects of an exercise program in individuals with chronic low back pain*

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## RESUMO

**Introdução:** A dor lombar é um importante motivo de consultas médicas, incapacitação para o trabalho e hospitalizações. **Objetivo:** Verificar alterações nos escores de dor e capacidade funcional da coluna em indivíduos portadores de dor crônica lombar, participantes de um programa de exercícios físicos. **Método:** Ensaio clínico não randomizado, com um total de 40 indivíduos participantes, 20 pacientes no grupo experimental e 20 pacientes no grupo controle. Os pacientes de ambos os grupos foram avaliados antes e após 5 semanas, quanto aos escores de dor e capacidade funcional da coluna. O programa consistiu de treinamento de flexibilidade com a mobilização articular e exercícios de alongamento para os membros superiores e inferiores e costas, bem como o treinamento de força para os músculos abdominais e isquiotibiais. Os participantes do grupo controle não receberam qualquer intervenção relacionada ao exercício, apenas cuidados médicos. **Resultados:** O grupo experimental apresentou resultados significativos em relação ao escore de dor ( $P<0,001$ ) e ao escore de capacidade funcional de Oswestry ( $P<0,001$ ) após as 5 semanas de seguimento, o grupo controle não obteve resultado significativo. **Considerações finais:** O grupo submetido ao programa de exercícios físicos obteve melhora significativa na dor e capacidade funcional quando comparado ao grupo controle.

**Palavras-chave:** Exercícios; Coluna Lombar; Dor.

## ABSTRACT

**Introduction:** Low back pain is a major cause of medical appointments, work disability and hospitalization. **Aim:** To measure changes in back pain scores and spinal functional capacity in individuals with low back pain after an exercise program. **Methods:** Non-randomized controlled trial of 40 participants (20 in the experimental group and 20 in the control group). Patients from both

groups were evaluated before and after the program. The program consisted of flexibility training using joint mobilization and stretching exercises for the upper and lower limbs and back, as well as strength training for the abdominal muscles and hamstrings. Participants in the control group did not receive any exercise-related interventions, only medical care. **Results:** the experimental group showed significant improvements in pain score ( $P<0.001$ ) and Oswestry functional capacity ( $P<0.001$ ) at 5-week follow-up, whereas the control group had no significant differences. **Final considerations:** In this study, an exercise program was associated with significant improvement in pain and functional capacity in patients with low back pain.

**Key-words:** Exercise; Lumbar Region; Pain.

## INTRODUCTION

Low back pain (LBP) reaches epidemic levels in the general population.<sup>1</sup> At some point in life, 70 to 85% of people will experience back pain,<sup>2</sup> which is a major cause of medical appointments, hospitalization, and work disability; approximately 10 million people in Brazil alone are disabled by this symptom.<sup>3</sup>

Two-thirds of all adults will experience low back pain at some point. Low back pain is the second leading reason for seeking medical care. Exercise therapy is not indicated in the acute phase, but can help prevent recurrent episodes and treat chronic low back pain.<sup>4</sup> Much discussion has focused on the optimal treatment modalities for LBP, and the choice of exercise program in patients with LBP is another issue in itself. Many studies have determined, and the American College of Sports Medicine now advocates, that exercise modalities focusing on strength, flexibility and endurance are indicated.<sup>5</sup>

As LBP is a condition for which no complete cure is available, patients are constantly exposed to a wide range of treatments and analgesics. Institution of exercise as a

therapeutic resource, which has no adverse effects and may improve or preserve the condition of these patients, would constitute major progress in terms of quality of life.

The aim of this study was to ascertain the effects of exercise on pain scores and spinal functional capacity in individuals with chronic LBP.

## METHOD

In this clinical trial, patients with LBP who presented to the Department of Physiatry at Hospital de Clínicas de Porto Alegre, Brazil, were allocated consecutively to one of two groups. Patients allocated to the experimental group were those who attended a medical appointment and were starting the exercise program. Patients in the control group were on a waiting list to join the hospital's "back school" awareness and rehabilitation program and were being followed at other hospital services.

The criteria for inclusion were age between 18 and 80 years and a history of current LBP. Patients of both sexes were included. The exclusion criteria were a history of exercise as treatment for LBP, history of or indications for surgical treatment of LBP, severe osteoporosis, grade III spondylolisthesis, or malignant spinal conditions.

Pain level was assessed using a self-administered standard score, which consisted of a visual analog pain scale represented by a 10-centimeter line with markings at 1-cm intervals from 0 to 10, where 0 represents no pain and 10 represents the most pain the individual can bear. Functional capacity was assessed with the Oswestry Low Back Disability Questionnaire, version 2.0 (self-administered).

### Protocols:

Each subject was assessed for pain and low back disability at the start of the study and after 5 weeks of follow-up. Participants in the experimental group took part in an exercise program twice a week, for 5 weeks.

The program consisted of flexibility training using joint mobilization and stretching exercises for the upper and lower limbs and back, as well as strength training for the abdominal muscles and hamstrings. All exercises were performed with no load other than the patient's own body weight, and consisted of one series of 10 repetitions.

Participants in the control group did not receive any exercise-related interventions, only medical care.

### Statistics

All variables of interest (sex, age, pain intensity, spinal functional capacity) were analyzed descriptively by means of absolute and relative frequencies.

Student's *t*-test for paired samples was used for comparison between scores at baseline and at the end

of the study. Student's *t*-test for independent variables was used for between-group comparison of quantitative variables. The significance level was set at 5% (two-sided). All analyses were done by intention to treat.

### Bioethics

This project was approved by the HCPA Research Ethics Committee (judgment number 05-253). All patients provided written informed consent for participation.

## RESULTS

Forty patients were included in the study; 20 patients in the experimental group underwent exercise training for 5 weeks, whereas the 20 controls did not receive any intervention, but only completed the study evaluation at baseline and at 5-week follow-up.

The average age of participants in the experimental and control groups was similar ( $P=0.8677$ ). There was a significant gender difference between the two groups ( $P=0.0125$ ): there were seven men in the experimental group, whereas the control group was composed entirely of women (Table 1). There were no significant between-group differences in pain scores ( $P=0.3748$ ) or Oswestry Questionnaire score ( $P=0.1284$ ) at baseline.

**Table 1** - Profile of the exercise (experimental) and control groups.

	Exercise Group	Control Group
Men	7	0*
Women	13	20
Age (years) (mean ± SD)	50.42 ± 15.47	49.6 ± 15.08

\* $P < 0.05$

A statistically significant change in Oswestry and pain scores from baseline was only observed in the experimental group. Participants in the control group did not show any significant differences in any of the analyzed scores.

A between-group comparison of scores at 5-week follow-up showed significant differences in Oswestry Questionnaire scores ( $P=0.003$ ) and in VAS pain scores ( $P=0.003$ ).

A between-group comparison of the change in disability scores (according to the Oswestry Questionnaire) showed a significant difference between the exercise group with the improvement in the score at 5-week follow-up.

A similarly significant between-group difference was observed in pain scores at 5-week follow-up. Participants in the exercise group experienced a greater reduction in pain scores. The biggest change in scores occurred in the exercise group.

The number needed to treat (NNT) in order to achieve a 50% reduction in pain was calculated using the formula  $NNT = 1 / \text{control rate} - \text{treatment rate}$ . The NNT was 2.7173 (approximately 3).

**Table 2** - Analysis of Oswestry Questionnaire and pain scores at baseline and at 5-week follow-up, experiment and control groups.

	Exercise Group			Control Group		
	Baseline	Follow-up	Variance	Baseline	Follow-up	Variance
Oswestry	36.33 ± 12.8	21.66 ± 10.83*	-14.73 ± 9.19	31.22 ± 10.00	32.22 ± 10.31	1 ± 6.97
Pain	5.72 ± 1.20	3.62 ± 1.82*	-2.31 ± 1.43	5.32 ± 1.58	5.90 ± 1.73	0.57 ± 1.34

Data were presented as mean ± SD

\*Statistically significant ( $P < 0.05$ ).

## DISCUSSION

In the present study, significant improvements in functional capacity and pain level were observed in patients with LBP who engaged in an exercise program over the course of 5 weeks. There were no significant improvements in these variables in the control group, and the between-group difference at the end of the study was highly significant.

The pain and functional capacity scores obtained at baseline showed no heterogeneity in the sample, although subjects had not yet been allocated to their respective groups.

The exercise group of this study included both men and women. However, the control group was entirely female. This difference was significant at baseline. Nevertheless, we believe sex will not have influenced the outcome of the study, as participants had similar Oswestry and pain scores at baseline.

Many studies have analyzed a wide range of techniques that might be used in the treatment of chronic low back pain. Studies that include exercise protocols have reported beneficial results. Corroborating our findings, one study reported decreased pain levels and improvement in Oswestry Questionnaire scores after a 6-week intervention.<sup>6</sup>

In a comparative study of physical exercise as an add-on to conventional pharmacotherapy versus pharmacotherapy alone, patients in the exercise group reported greater reductions in pain intensity and disability than those who received medication alone.<sup>7</sup>

In a continued search for treatment options, Rasmussen et al. (2003) compared muscle stabilization exercises with manual therapy-based intervention. At the end of the study, pain scores were better in the stabilization training group.<sup>8</sup>

Intense exercise has traditionally been ruled out in patients with painful conditions. However, some researchers have investigated this modality. One study compared intense physical exercise with conventional physical therapy and found better pain scores, functional capacity, and reduction in out-of-work days with high-intensity exercise.<sup>9</sup> Another study compared intense aerobic exercise versus passive modalities in terms of pain control, and found better outcomes in pain level, disability, and psychological status among participants in the intense exercise group.<sup>10</sup>

Some studies have analyzed exercise duration. Among these, one evaluated the response of a strength and flexibility training program and found improvement in pain level and Oswestry Questionnaire scores after 12 months.<sup>11</sup> Another study found that physical training improved functional capacity and reduced pain and general disability after a year.<sup>12</sup>

This program included static stretching, mobility exercises, and strength training, using a single series of 10 repetitions. Improvements in endurance activity performance have been reported after training in LBP patients. Raiville et al. (2004) observed improvement in LBP and disability, lower limb pain, and physical test performance in patients who received endurance, strength, and flexibility training.<sup>13</sup> Other modalities have also been compared, including different exercise groups, strength, walking, and physical therapy. The best results

in terms of improvement in pain scores were obtained with strength training and physical therapy.<sup>14</sup>

The optimal intensity of exercise in patients with LBP has yet to be established. Few studies have addressed this subject, such as a comparative study of graded training versus walking. Graded training provided an advantage over walking in terms of improvement in disability and other health parameters.<sup>8</sup>

There is no consensus among investigators as to the optimal frequency of exercise. One study compared both short- and long-term exercise programs (6 weeks and 12 months) with a frequency of two or three sessions per week. There was no significant difference between the two groups, and benefits were already detectable shortly after the start of the program.<sup>15</sup>

## FINAL CONSIDERATIONS

In this study, individuals with LBP who participated in a strength, flexibility and mobility training program experienced improvement after 5 weeks as compared with controls who did not engage in any physical exercise. These results were obtained in a relatively short time. Further studies are warranted to ascertain the long-term effects of this or similar programs in this patient population and define other variables of interest, such as associated activities, frequency, periodicity, and intensity of exercise, and exercise load.

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**Conflict of interest:** The authors have no conflicts of interest to declare.

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