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Back school program for back pain: education or physical exercise?

Escola de postura para dor de coluna: educação ou exercício físico?

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Abstract

Introduction: Back school consists in an educational program aimed at preventing back pain and rehabilitating individuals with degenerative disorders. **Objective**: To evaluate the effects of back school components (education and/or exercise therapy) in relieving pain and improving quality of life in patients with chronic back pain. Method: Forty-one patients were randomized and allocated into four groups: (i) a back school group (educational lessons and physical exercise); (ii) an educational lessons group; (iii) a physical exercise group and (iv) a waiting list control group**.** Patients were evaluated before and after treatment with a visual analogue scale, a short form quality-of-life questionnaire, a Roland Morris disability questionnaire and a finger-floor distance test**.** Results: The back school group showed significant reduction in scores in the visual analogue scale and the Roland Morris disability questionnaire and an increase in the short-form quality of life questionnaire. Conclusion: The effectiveness of back school programs in chronic back pain patients seems to be due to the physical exercise component and not on account of the educational lessons.

Key words: Aging; Physical therapy; Musculoskeletal abnormalities.

Resumo

Introdução: A escola de postura consiste em um programa educacional visando a prevenir dores na coluna e reabilitar indivíduos com desordens degenerativas. **Objetivo:** Examinar os efeitos dos componentes da escola de postura (educação e/ou exercícios terapêuticos) para aliviar dor e melhorar a qualidade de vida dos pacientes com dor lombar crônica. **Método**: Quarenta e um pacientes foram randomizados e alocados em quatro grupos: (i) grupo escola de postura (lições educativas e exercícios terapêuticos); (ii) grupo lições educativas; (iii) grupo exercício terapêutico e (iv) grupo controle (pacientes da lista de espera). Avaliaram-se os pacientes no início e no fim do tratamento usando-se: escala visual analógica, questionário de qualidade de vida abreviado, questionário de incapacidade de Roland Morris e teste distância dedo-chão. **Resultados**: O grupo escola de postura apresentou redução significativa nos escores da escala visual analógica e nos do questionário de incapacidade de Roland Morris, além do aumento dos escores de saúde do questionário de qualidade de vida abreviado. **Conclusão**: A eficácia do programa da escola de postura no tratamento de pacientes com dor lombar crônica parece ser devido ao programa de exercício terapêutico e não as lições educativas.

Descritores: Anormalidades musculoesqueléticas; Envelhecimento; Fisioterapia.

Introduction

Chronic back pain (CBP) is a common musculoskeletal problem with high socioeconomic consequences[1]. It is estimated that more than $50 billion per year are spent on CBP treatment in America[2]. However, treatment options for CBP have not been fully explored[3]. Some studies suggest that back school programs can be a low-cost, efficient, and effective therapeutic strategy available for patients with CBP[4-7].

Back school (BS) consists in an educational program aimed at preventing back pain and rehabilitating individuals with degenerative spine disorders[8]. Through educational lessons with theoretical and practical information comprising spine anatomy, biomechanics, optimal posture, ergonomics, and exercises, back school programs seek to make patients become responsible agents in their own recovery process and in the maintenance of quality of life[9-12].

Recently, one systematic review on the effectiveness of physical and rehabilitation interventions showed no statistically significant short-term difference in BS treatment effect on pain and disability of the spine when compared to waiting list controls, subjects not undergoing treatment, and individuals receiving usual care[13]. However, another review presented moderate evidence suggesting that back school programs could reduce pain and improve function in patients with chronic back pain in the short- and intermediate-term, when compared to other strategies, such as physical exercises, manipulation, myofascial therapy, receiving advice, or placebos, or even when compared to waiting list controls[12].

Since its introduction by Forsell[14] in Sweden, the content and length of back schools have varied widely[12]. Although the content of most of back schools involves educational programs and physical exercises, there is heterogeneity in school programs designs, such as, for example, differing number of sessions and physical training intensity. This can be partially responsible for the controversial evidence of back schools' effectiveness. Thus, in this study we assess back school program effectiveness and the specific role of each program component (educational lessons and physical exercises) in relieving pain, reducing disability, and improving quality of life in patients with chronic back pain.

Material and methods

Study design

A single-blind, randomized, controlled trial was performed. The experiment was conducted under a protocol approved by local Research Ethics Committee (CCS), Federal University of Pernambuco (UFPE) – Protocol Number: CAAE – 0313.0.172.000-09) and in accordance to the Declaration of Helsinki. All participants gave their written informed consent prior to the experiment.

Sampling

The patients were recruited from the physical therapy clinic of Hospital das Clínicas (UFPE), other university health centers, and the local community. Patients of both genders, aged between 50 and 80 years and having chronic non-specific back pain, participated in the experiment. Excluded from the study were subjects suffering from back pain for less than six months or whose pain was due to a specific cause (e.g. disc herniation, fracture, spondylolisthesis); those who received treatment for pain with another intervention at the time of the study or had any oncologic, neurologic, and/or rheumatologic diseases; and anyone who was unable to answer questionnaires.

Experimental design

Forty-one patients were randomized (through sealed, sequentially-numbered opaque envelopes) and allocated into four groups (Figure 1): (i) the back school group (BSG; n=11), which underwent educational lessons and physical exercises; (ii) the educational lesson group (ELG; n=10), which only underwent educational sessions; (iii) the physical exercise group (PEG; n=10), which only underwent physical exercises, and (iv) the waiting list control group (CG; n=10), which underwent no treatment. In order to perform a single-blind study, two researchers were involved in the experiment. Patients were instructed to not report to the researcher the intervention that they had undergone during the sessions. However, it was not possible to blind the patients due to the nature of the intervention.

One of the therapists evaluated the patients before and after treatment sessions and was unaware of group allocation. The other therapist was responsible for the educational lessons and physical exercises. During five weeks, patients underwent ten sessions in the BS program, two times per week.

The BSG, ELG and PEG groups were assessed before (T0) and after ten sessions (T1). On the other hand, despite not having undergone therapeutic intervention, the CG subjects were evaluated and re-evaluated at the same time as those in the other three groups.

Outcomes measures

Socio-demographic and clinical data were collected before sessions. The primary outcome measure was pain intensity measured by the visual analogue scale (VAS). VAS ranging from 0 to 10, where 0-2 is considered mild, 3-7 is moderate and 8-10 is severe. VAS is a sample robust, sensitive, and reproducible instrument to measure numerically the pain intensity level perceived by patients[15]. The secondary outcomes were the short form of the WHO quality of life questionnaire (WHOQOL-BREF), the Roland Morris disability questionnaire (RMDQ), and the finger-floor distance test (FFT).

The WHOQOL-BREF, adapted from the WHOQOL-100, was used to measure quality of life[16]. This questionnaire checks patient well-being and functional health. The validity and

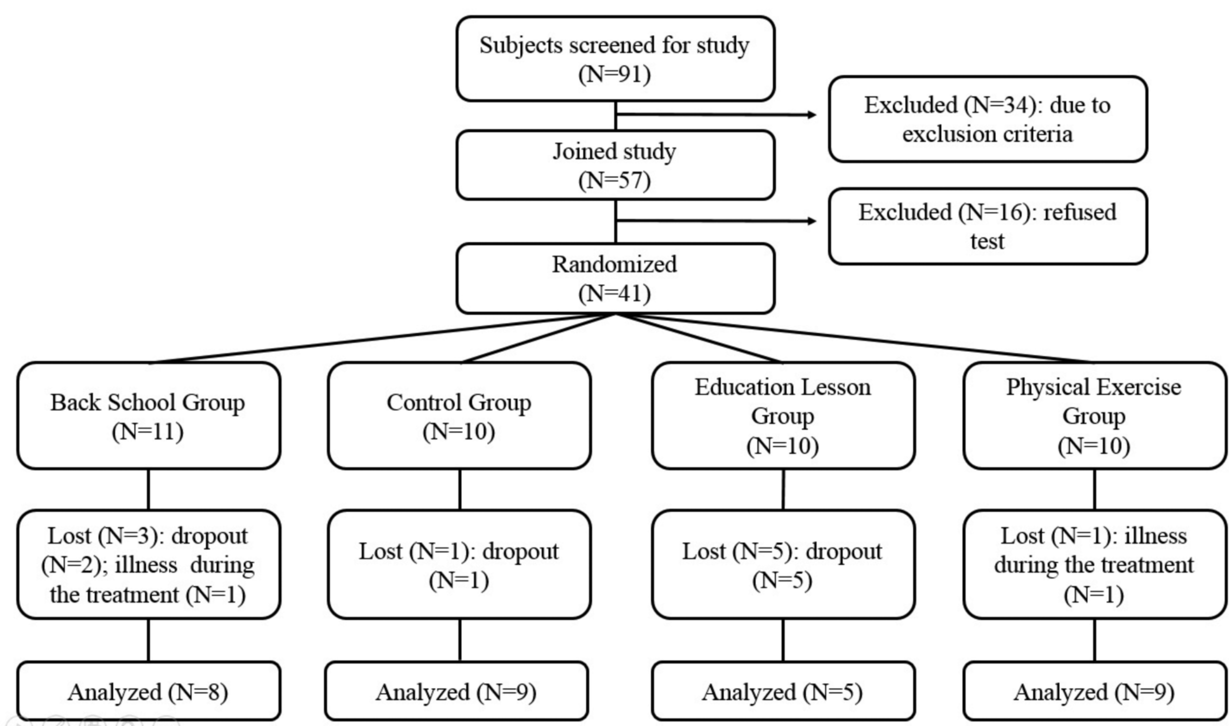

Figure 1: Patient distribution for the study

reliability of the Brazilian version have been confirmed[17]. The WHOQOL-BREF consists of 26 items in four domains: physical, psychological, social, and environmental. Each item is scaled from 1 to 5. Higher scores indicate greater quality of life. The RMDQ measured the disability associated with back pain. This questionnaire consists of 24 dichotomous (yes/no) questions describing daily activities which patients may have difficulty to perform due to back pain. A higher score on the 24-point scale of the RMDQ indicates a maximum level of disability[18]. The validity and reliability of the Brazilian version of the RMDQ is well documented[19-21]. The FFT was used for expressing spinal mobility, measuring the distance from the middle finger to the floor with a tape while the patient remained in orthostatic position during forward bending of the trunk with the knees, arms, and fingers fully extended. FFT was not applied in the CG.

Experimental procedure

The BS program was divided into educational lessons, physical exercises, and relaxation sessions, of approximately 30 minutes each. The educational lessons consisted of ten theoretical sessions dealing with pain concepts, basic anatomy, spinal kinesiology and biomechanics, physiopathology of back disorders, ergonomics in daily living activities, and proper posture (e.g., posture at work, how to lift and transport objects correctly, etc.). In addition, during the educational lessons, the therapist was instructed to involve patients in activities simulating real situation of their daily living environment (practical training). The physical exercises were dedicated to the maintenance of a "healthy back", e.g., self-stretching trunk muscles (erector spinae), and performing abdominal reinforcement and postural exercises. In addition, strength training of leg and upper limb muscles was performed. Five series of ten repetitions with 30-second rest periods between series were performed. In order to encourage home exercises, pamphlets were given to the patients with further explanations regarding theoretical lessons, physical exercise protocols, and ergonomics. In the relaxation sessions, the patients were submitted to massage, myofascial release, and trigger point therapies on trunk muscles. The BS program was carried out by physical therapy students and physiotherapists. Apart from the pamphlets, the control group did not receive any treatment or any further information.

Data analysis

Descriptive statistics, including proportions for categorical variables, means, and standard deviations for continuous variables were computed. Pearson's chi-squared test was performed on the categorical data. Changes in pain perception (VAS), quality of life (WHOQOL-BREF), disability associated with back pain (RMDQ), and patient spinal mobility (FFT) before and after treatment were measured by computing percent changes in each outcome variable ([T0 score – T1 score]/baseline score). Since Kolmogorov-Smirnov testing revealed normal distribution of variables, significant treatment effect was tested by the one-way analysis of variance (ANOVA) model, with intervention type as one factor (difference among groups), and by the Bonferroni post hoc test. $P < 0.05$ was considered statistically significant. Analysis was performed using SPSS (Statistical Package for Social Sciences), version 18.0 for Windows (SPSS Inc, Chicago IL, USA).

Minimal clinically important differences (MCID) were observed when assessing outcome data. The MCID value for the RMDQ was five points; for VAS, it was three points.

Results

Fifty-seven patients with back pain were enrolled in the study. However, sixteen subjects refused to participate as research subjects. Forty-one were randomly assigned to one of four groups. Over a period of five weeks, ten participants dropped out spontaneously from the study for health or personal reasons: three in the BSG, one in the CG, five in the ELG and other one in the PEG. The final sample consisted of thirty-one patients (BSG: N=8; PEG: N=9; ELG: N=5; CG: N=9) (Figure 1).

As shown in Table 1, four groups of patients were compared, since there were no statistical differences in demographic and clinical data among the groups before the BS program (T0).

The VAS scores for all four groups were recorded before and after the BS program and are shown in Figure 2. Patients of the BS group showed a significant reduction of pain scores. After the last day of treatment, the VAS score of pain perception was reduced by 40.2% and 47.1% when compared to the scores before the intervention in the BSG and the PEG, respectively, showing a significant decrease when compared to the CG and the ELG. There was no difference in mean pain reduction between BSG and PEG (P=0.611) and between ELG and CG (P=0.827).

As regards disability associated with back pain, reduction in RMDQ scores in the BSG and PEG when compared to the first measure (before the BS program), indicates decrease of disability level of patients after the back school and physical exercise programs (Figure 3). The mean

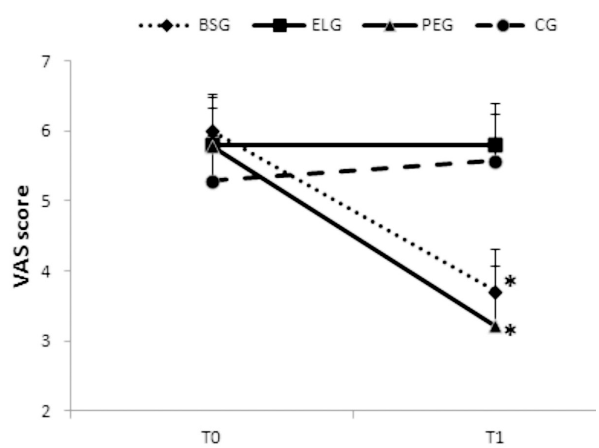

Figure 2: Visual analog scale (VAS) score mean of the back school group (BSG), educational lesson group (ELG), physical exercise group (PEG) and control group (CG) before (T0) and after sessions (T1). Asterisks (*) indicate significant deviations compared to CG (P < 0.05). Vertical bars depict standard error of mean

Table 1: Comparison of patients' characteristics and baseline data

	BSG N=8	ELG N=5	PEG N=9	CG N=9	p-value
Gender Female/Male	8/0	5/0	9/0	8/1	0.471
Age (years)	69.6±6.0	73.2±9.6	70.1±2.7	64.6±8.5	0.139
Weight (kg)	63.7±8.9	57.4±8.3	67.5±5.6	65.9±14.3	0.302
VAS score (0-10)	6.0±1.4	5.8±3.0	5.7±2.1	5.2±1.7	0.928
RMDQ score (0-24)	8.3±4.3	12.4±3.2	9.0±6.8	7.0±4.5	0.325
Physical-WHOQOL-BREF score (7-35)	23.7±2.2	23.6±3.5	25.7±3.5	23.2±3.3	0.386
Psychological-WHOQOL-BREF score (6-30)	22.3±1.9	22.0±1.4	22.1±1.7	21.4±1.8	0.779
Social Relations-WHOQOL-BREF score (3-15)	12.0±1.1	12.0±1.1	12.0±1.6	13.0±1.5	0.117
Environment-WHOQOL-BREF score (8-40)	25±2.7	27.0±1.5	27.0±3.1	24.0±4.0	0.206
Score total WHOQOL-BREF (26-130)	83.0±5	83.0±6.6	87.0±8.1	92.0±9.3	0.089
FFT (cm)	24.9±9.2	28.0±3.1	26.4±9.8	–	0.89

The results are means (standard deviations); (BSG) Back school group; (ELG) Educational lesson group; (PEG) physical exercise group; (CG) control group; (VAS) visual analogue scale; (RMDQ) the Roland Morris Disability Questionnaire; (WHOQOL-BREF) Short Form of WHO Quality of Life Questionnaire; (FFT) finger-floor distance test. Pearson Chi-Square was used to compare gender distribution among groups and ANOVA one-way was used for all other measurements.

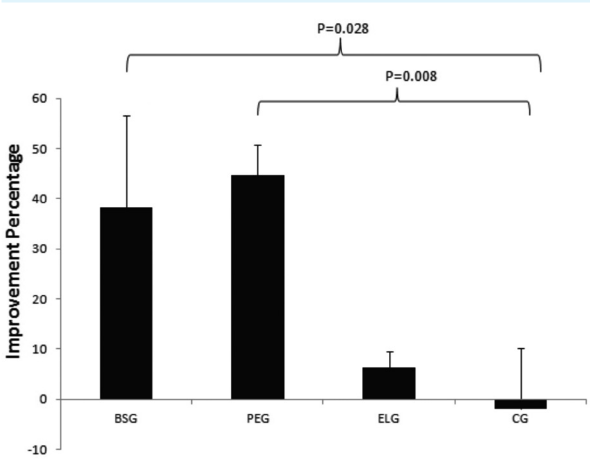

Figure 3: Improvement percentage (%) of disability associated with back pain from baseline, identified through the Roland Morris Disability Questionnaire in the back school group (BSG), educational lesson group (ELG), physical exercise group (PEG), and control group (CG). Vertical bars depict standard error of mean

improvement was similar in both BSG and PEG (*P*=0.645) and between CG and ELG (*P*=0.768).

The BSG and PEG groups showed a significant increase of the overall health score of WHOQOL-BREF, whereas for ELG and CG this score did not vary significantly. Compared to the control group, all groups showed improvement in psychological domains of WHOQOL-BREF. However, for physical domains, significant change was observed only in BSG. The social relation and environmental domains of WHOQOL-BREF did not change after the intervention sessions (Table 2).

Figure 4 show that there was a trend of increased spinal mobility over the course of the sessions in three groups (BSG, PEG and ELG). Nevertheless, this result was not confirmed by statistical tests (*P*>0.05).

Figure 5 shows results for pain intensity (VAS) and disability associated with back pain (RMDQ). For the VAS it was observed that most patients reached the MCID (BSG = 42.8%; CG = 22.2%; PEG = 33.3%) and RMDQ (BSG = 12.5%; GC = 12.5%; PEG = 33.3%).

Table 2: Change (%) of the World Health Organization Questionnaire of Quality of Life (WHOQOL-BREF) scores in each domain from baseline

WHOQOL-BREF Domains	BSG N=8	ELG N=5	PEG N=9	CG N=9
Physical	12.6 ± 4.3*#	2.0 ± 1.7	3.5 ± 3.3	2.4 ± 2.1
Psychological	5.2 ± 2.8*	4.0 ± 3.0*	7.8 ± 1.9*	6.5 ± 2.7
Social relations	5.7 ± 1.7	-2.0 ± 2.0	1.6 ± 3.9	-3.0 ± 14.3
Environment	7.2 ± 3.4	-6,2 ± 5.8	7.2 ± 2.8	10.4 ± 7.2
Score Total	8.0 ± 1.8*#	4.8 ± 4.5	9.0 ± 6.8*	7.0 ± 4.5

BSG: back school group, ELG: educational lesson group, PEG: physical exercise group; CG: control group. "*", "#" symbols indicate significant deviations (p<0.05) of control group and educational lesson group, respectively (one-way ANOVA, Bonferroni *post hoc* test).

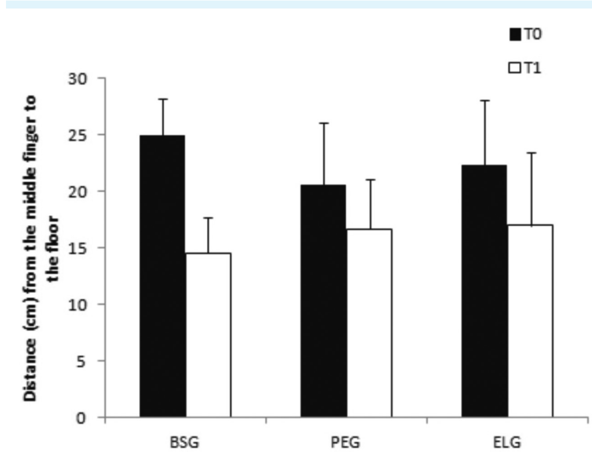

Figure 4: The spinal column mobility measurement by finger-floor test before (T0) and after (T1) sessions in the back school group (BSG), educational lesson group (ELG) and physical exercise group (PEG). Columns show the mean distance (cm) from the middle finger to the floor. Vertical bars depict standard error of mean

Discussion

The study demonstrated the effectiveness of intensive BS programs in chronic non-specific

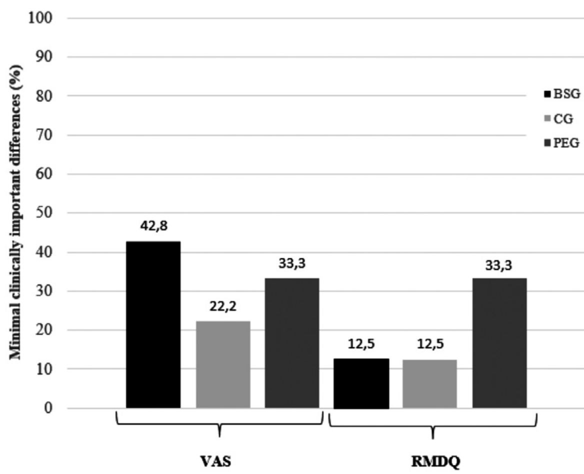

Figure 5: Minimal clinically important differences for Visual Analogue Scale (VAS) and Roland Morris disability questionnaire (RMDQ). BSG: back school group; CG: control group; PEG: physical exercise group

back pain treatment in regard to reducing pain perception and disability and improving quality of life (See Figure 5 for the minimal clinically important difference (MCID) achieved by BSG, PEG and CG). These results seem to be due to the physical exercise program of BS and not to the educational lessons. Moreover, the increase of spinal mobility seems not be a key point in obtaining positive results for chronic non-specific back pain.

In line with our results, some previous studies have observed positive effects of BS programs on pain perception and quality of life in patients with CBP[12]. Morone et al.[6] suggest the positive effects may be due to the association of physical exercise and educational program performed in back schools. On the other hand, some researchers concluded that there is insufficient evidence to recommend BS intervention for patients with back pain[22,23]. Poor descriptions of BS protocols make comparisons across clinical trials very difficult. Besides using different study populations and outcome measures, the studies differ also in content and length of BS theoretical education[12]. The focus of BS on theoretical education or on practical training could justify the discrepant effects of those studies. Our results pointed out that physical exercise programs, not educational lessons, are the main component responsible for the effectiveness of BS program. Thus, we speculate that BS without or with little focus on exercise programs would have low impact on back health.

At present, the value of purely educational approaches on clinical measurements has not been addressed. Thanks to anatomical and biomechanical knowledge about the spine, optimal posture and ergonomics could be explained in educational lessons in BS. Hence, it has been speculated that patients would be able to change movement habits and incorrect posture that harm back health, and that those habit changes should be able to lead to physical improvements[5].

However, the educational aspects of our study were not effective in reducing perception of pain and disability nor in improving patients' quality of life. One possible explanation could be the short follow-up time. It is possible that the impact of educational lessons on pain and quality of life are time-dependent and that the short duration of changes of habit (five weeks) was not enough to lead to physical improvement. Indeed, previous studies have found positive effects on patients' quality of life three and six months after BS intervention, but not immediately after treatment[12]. The importance of time needed to transfer the knowledge acquired in BS programs for daily living has already been discussed by Lonn et al.[5]. It would be beneficial in the future to examine the time-response relationship between educational programs and habit changes after BS intervention.

However, it seems, at least in the short term, that exercise therapy is the main component responsible for positive effects of BS on chronic back pain. In line with this finding, exercise programs are one of the most recommended treatments for back pain[24]. The aim of our exercise therapy was to prevent muscle spasm, strengthen back muscles, and increase general back muscle flexibility. It has been reported that the majority of chronic back pain disorders without spinal pathology are frequently associated with lack of flexibility[25]. Postural strain, prolonged immobilization, or poor body mechanics may lead to spinal alignment problems and muscle shortening, causing back pain. Thus, improved flexibility can alleviate back pain and maintain good posture and balance. However, despite pain reduction in the BSG and PEG, we did not see evidence of an increase in column flexibility. This finding is inconsistent with previous studies reporting a relationship between clinical pain intensity and column flexibility among persons with chronic pain[26,27]. Our findings suggest that other factors other than trunk flexibility may have influenced pain reduction. For example, decrease of connective tissue strain, muscle endurance, improvement of local blood circulation (better oxygen and nutrients supply to the back), reduction of pain-related fear, and other exercise-related effects may have been contributing factors[28].

In contrast to our study, Sahin et al.[29] observed recently that an educational program on the functional anatomy of the lower back, the function of the back, pain, and the correct use of the back in daily life, associated with physical exercises, has greater positive effect on pain and disability than exercise programs without educational lessons. In the Sahin et al.[29] study, during the educational program, all patients were interviewed and assessed by a physiatrist who advised each patient individually on how to use back movements based on his or her lifestyle. This specific monitoring of patients by the physician may have influenced the outcomes.

Some limitations of our study should be mentioned. First, long-term outcomes were not assessed, and it is not known whether the differences observed post-back school and post-physical exercise programs can be maintained over time or whether the effect of educational lessons could be observed in the follow-up. Second, small sample size of the ELG may have resulted in the lack of statistical representation of its effect. Third, the results of this study do not reveal whether relaxation techniques alone are beneficial for back pain treatment**.** Few studies have examined the efficacy of Cherkin[30] relaxation techniques in treatment of chronic back pain, and most lack methodological rigor.

Our relaxation sessions were not aimed at treating musculoskeletal pain, so we should completely disregard the possibility that relaxation techniques have somehow influenced our results. However, soft-tissue therapy is often combined with other intervention techniques to treat chronic pain dysfunctions. In principle, in our study the association between relaxation sessions with exercise therapy in the BS group could have had a greater impact on pain reduction than in the other groups; however since the effect of BS on pain reduction was slightly lower than what it was in the exercise therapy group, this is improbable, in our opinion.

Conclusion

Our study demonstrated that it is possible to obtain an improvement in quality of life and a reduction of disability and pain perception with BS intervention in patients with chronic back pain. BS programs seem to be a low-cost and non-pharmacological alternative for reducing chronic back pain. In addition, it is the physical exercises, rather than the educational lessons, of BS programs that have a greater impact on pain perception, disability, and quality of life of patients with chronic back pain.

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