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Original Article

Pilates method evaluation on the treatment of subjects with non-specific chronic low back pain: randomized clinical trial

Avaliação do método Pilates no tratamento de indivíduos com dor lombar crônica inespecífica: ensaio clínico randomizado

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ABSTRACT

Introduction: Chronic nonspecific low-back pain (CNLBP) is a common painful symptom in the lower spine for more than twelve weeks and may be accompanied by neurological symptoms in the lower limbs. CNLBP has a high worldwide prevalence, can lead to function limitations and the treatment emphasizes active therapies, such as Pilates exercises. **Objective:** To evaluate the effect of Pilates exercises on painful perception, quality of life, functional disability and kinesiophobia of individuals with CNLBP, classified as having low and medium risk of poor prognosis according to the Brazilian version of the *Start Back Screening Tool* (SBST-Brazil). **Methods:** Randomized controlled clinical trial with 59 patients clinically diagnosed with CNLBP, divided into two groups: Control (CG) and Pilates (PG). For 12 weeks the CG received drug intervention while the PG was submitted to a Pilates method exercise protocol twice a week. **Results:** Pilates training reduced pain and kinesiophobia in both subgroups with SBST-Brazil Low and Medium. Contrary to participants with medium risk of poor prognosis in the CG, the PG with medium risk showed a significant improvement ($P < 0.05$) in functional capacity. The pharmacological intervention proved to be efficient ($P < 0.05$) in reducing pain catastrophization and kinesiophobia in the CG classified as having a medium risk of poor prognosis. **Conclusion:** Stratification in low and medium risks for poor prognosis of disability has positive responses to treatment based on Pilates exercises, considering the reduction of painful intensity and functional limitation.

Keywords: low back pain; chronic pain; disability evaluation; physical therapy; exercise therapy.

RESUMO

Introdução: A dor lombar crônica inespecífica (DLCI) é uma sintomatologia dolorosa comum na região inferior da coluna por período superior a doze semanas, podendo ser acompanhada de sintomas neurológicos em membros inferiores. A DLCI apresenta alta prevalência mundial, pode conduzir a limitações de função e o tratamento enfatiza terapias ativas, tais como exercícios de Pilates. **Objetivo:** Avaliar o efeito de exercícios de Pilates na percepção dolorosa, qualidade de vida, incapacidade funcional e cinesiofobia de indivíduos com DLCI, classificados com baixo e médio riscos de mau prognóstico conforme a versão brasileira do *Start Back Screening Tool* (SBST-Brasil). **Métodos:** Ensaio clínico randomizado controlado com 59 pacientes diagnosticados clinicamente com DLCI, divididos em dois grupos: Controle (GC) e Pilates (GP). Durante 12 semanas, o GC recebeu intervenção medicamentosa enquanto o GP foi submetido a um protocolo de exercícios do método Pilates duas vezes na semana. **Resultados:** O treinamento com Pilates reduziu dor e cinesiofobia em ambos os subgrupos com SBST-Brasil Baixo e Médio. Contrariamente aos participantes de médio risco de mau prognóstico do GC, o GP com médio risco apresentou melhora significativa ($P<0,05$) da capacidade funcional. A intervenção farmacológica se mostrou eficiente ($P<0,05$) na redução da catastrofização da dor e cinesiofobia no GC classificados com médio risco de mau prognóstico. **Conclusão:** A estratificação em baixo e médio riscos para mau prognóstico de incapacidade têm respostas positivas ao tratamento baseado em exercícios do método Pilates, considerando a redução da intensidade dolorosa e da limitação funcional.

Palavras-chave: dor lombar; dor crônica; avaliação da deficiência; fisioterapia; terapia por exercício.

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Introduction

Low back pain (LBP) is a symptom experienced by people of all age groups, being defined as pain in the dorsal region, located between the lower margin of the twelfth pair of ribs and the lower gluteal folds, which may or may not be accompanied by pain or other neurological symptoms in one or both lower limbs [1].

In Brazil, it is estimated that the annual prevalence of LBP in adult individuals is >50% [2-4]. The literature science shows that 80% of the population will present at least one episode of LBP during his life, and up to 40% of these cases may become chronic [3,4].

LBP is characterized by a serie of biophysical, psychological, and social aspects that impair function, participation in society and personal financial prosperity [5]. Its economic impact is multisectoral, as it increases the costs of medical and social assistance systems and the rate of absenteeism, being currently considered the number one cause of years lost due to disability, and its burden is growing along with the increase and aging of the population [1,6]. It is classified as acute, subacute, and chronic, when the duration of the painful episode, respectively, is less than six weeks, lasts between six to twelve weeks or is greater than twelve weeks [7,6].

However, only a low percentage of cases of LBP have a specific cause, with the nonspecific cause of this painful sensation being more prevalent (in 85% of patients), which is called nonspecific LBP due to the inability to determine its causal factor, such as, for example, reduced space in the intervertebral discs, bone or joint injuries and compression of nerve roots [5]. In addition, it is also observed among patients emotional and behavioral impacts that favor the development of chronic conditions [1,6], and the evidence shows that psychosocial factors such as the patient's perception about the difficulty of coping with the disease, the pain catastrophizing and other depressive symptoms are predictors of dysfunction and directly interfere with the prognosis [8,9]. Therefore, the application of a questionnaire that evaluates the interaction of LBP with psychosocial factors, and classify patients according to their condition, can help in decision making during treatment.

Several studies have tested the effectiveness of the STarT Back Screening Tool (SBST) questionnaire [8,10,11] and found that patients classified and treated according to the SBST obtained satisfactory results due to improved quality of life, decreased use health services and reduced days of absenteeism from work compared to those not classified in the same way. It is noteworthy that identifying patients with psychosocial factors can influence the prognosis and assist in choosing the most specific treatment, in addition to enabling the patient to better understand the signs and symptoms of LBP [11,12]. Current recommendations for managing LBP emphasize self-management of pain, psychosocial and exercise therapies, as well as some forms of complementary medicine such as spinal manipulation, Tai Chi, massage, acupuncture and yoga, with less emphasis on pharmacological and surgical treatments [6,13]. In this context, the method Pilates is often used to treat LBP, conside-

ring that consists of a collection of exercises that focus on static control and dinamic the muscles of the trunk, improving the stability and mobility of the spine, coordination breathing, overall flexibility, muscular strength and the position [14]. However, due to the insufficient number of quality clinical trials [15], as well as notable heterogeneity in relation to the populations studied, the proposed interventions and outcome measures, there is no consensus in relation to its effectiveness in treating this condition.

Therefore, considering that LBP is the painful syndrome that causes more functional disability than any other health condition, causing a great socioeconomic impact, interfering in the quality of life of this population [16-18], the aim of the present study is to evaluate the effect of exercises based on the Pilates method in reducing pain perception, quality of life, functional capacity and kinesiophobia of adults with chronic nonspecific low back pain (CNLBP), ranked at low and medium risks of poor prognosis in the primary treatment as the Brazilian version of SBST (SBST-Brazil).

Methods

Experimental design

To address the question, a clinical trial, randomized-controlled, open, parallel, with two arms was performed. 59 subjects with clinical diagnosis for CNLBP participated in the study, divided into the Control (CG) and Pilates (PG) groups.

In both groups, the participants were stratified into low and medium groups (SBST-Brazil) ranked by the risks of poor prognosis in primary treatment. Prior and after the intervention period, participants answered four questionnaires to assess quality of life, kinesiophobia, functional disability and pain catastrophizing. During a 12-week period, the CG received drug intervention while the PG was submitted to a training protocol in the Pilates method with floor exercises.

The study was performed in accordance with the Regulatory Guidelines and Norms for Research involving human beings (Resolution 466/2012 of the Brazilian National Health Council) and ethical determinations of the Declaration of Helsinki (2000) and was approved by the Research Ethics Committee of the Universidade de Pernambuco (CEP-UPE), under the number 3,259,512. In addition, the research also was registered in the Brazilian Registry of Clinical Trials (BRCT) under number RBR 9s3fbm and in the World Health Organization (WHO) under Universal Trial Number (UTN) number A00824830946. All participants signed an informed consent form.

Recruitment and selection of participants

The recruitment of participants was carried out by means of broadcasting on radio and television, as well as through digital media on social networks and blogs and poster display in public places in the Integrated Region of Economic Development (IRED) of the Polo Petrolina/PE and Juazeiro/BA.

Inclusion criteria were clinical diagnosis of CNLBP; both sexes; age group between 18 and 59 years; literate; self-declared sedentary or irregularly active according to the International Classification of Physical Activity Level Assessment (IPAQ-short version) [19]; classified as having low or medium risk of poor prognosis in primary treatment according to the SBST-Brazil questionnaire [12].

Exclusion criteria were: previous participation in a Pilates exercise program or other therapeutic exercises in the last six months; schedule or history of spinal surgery; unexplained weight or appetite loss in the past 6 months; history of cancer or malignancy; lesion of the horse tail; loss of bladder or bowel control; saddle paresthesia; pregnancy; spine fractures; rheumatological diseases; inflammatory and/or infectious diseases of the spine; presence of comorbidities that prevented the practice of physical exercises.

Aiming at the eligibility criteria and aiming to classify the risk of poor prognosis in primary treatment and in individuals with CNLBP according to the presence of physical and psychosocial factors, the volunteers answered the SBST-Brazil. The stratification of subgroups was held in accordance with the results of the questionnaire [12]: a) individuals with low risk of poor prognosis (between 0 and 3 points of the total score): presence of minimal physical and psychosocial factors; b) individuals wih medium risk of poor prognosis (values greater than 3 on the total score and subscale ≤ 3 points): presence of physical and psychosocial factors, but at lower levels than individuals classified as high risk).

Meeting the eligibility criteria, volunteers classified as having low or medium risks for poor prognosis in primary treatment according to the SBST-Brazil, were sent to an interview, conducted by a physiotherapist, containing sociodemographic information, factors associated with behavior and lifestyle habits, personal history, and clinical-orthopedic data.

Then the participants were referred for evaluation with orthopedic doctor to confirm or not the diagnosis of CNLBP and to evaluate the clinical conditions for possible performance of inerventions through exercises with Pilates method or drug intake.

After all these procedures, the groups were allocated by a researcher who was not involved in the evaluation and intervention of the participants, based on the generation of random numbers in Excel® (Microsoft Corporation, Redmond, WA, United States, Release 12.0.6662, 2012). The data for each patient were protected in individual, numbered and sealed opaque envelopes [17]. According to the SBST-Brazil classification (low and medium) the participants were allocated according to the type of intervention resulting in the groups CG SBST Low, CG SBST Medium, PG SBST Low and PG SBST Medium.

Procedures

Psychometric assessments were applied individually in a private room, where each volunteer responded to the following instruments: 1) Medical Outcomes Study 36 - item Short- Form Health Survey - SF36 [20]; 2) Roland Morris questionaire disability [21]; 3) Tampa Scale for Kinesiophobia [22]; 4) Scale of Catastrophic Thoughts on Pain [23] duly validated for the Brazilian population. The evaluations (PRE and POST moments) took place at the University of Pernambuco (UPE) Campus Petrolina in the period between March and December 2019.

Both the CG SBST Low as CG SBST Medium received drug intervention with 550 mg of naproxen sodium at no cost for the participant, being prescribed by an orthopedist. The medication was administered continuously for 12 weeks twice a day, respecting the contraindications. These two subgroups were properly monitored by the same doctor orthopedist until the end of the protocol. The use of medication in the CG was chosen considering the evidence in the scientific literature [24-27], which, in view of pain complaints, the failure to use an effective treatment violates the ethical principles that guide research with human beings.

PG SBST Low and Medium received exercises based on Pilates method, guided and supervised by a qualified physiotherapist twice a week also for 12 weeks. The exercises are part of a protocol developed by the researchers themselves, which includes the use of exercises on the ground and on the equipment (Springboard, Cadillac, Reformer, Ladder Barrel and Chair). The prescription of the protocol with three levels of four weeks each was composed of: I. Basic Level (integration of upper and lower supine position, stabilization of the spine and stimulus to mobilize low amplitude motion); II. Intermediate Level (lowering of weight on lower limbs; control of the stabilizing muscles of the pelvis and trunk; stimulation of vertebral mobilization); III. Advanced Level (integration of upper and lower limbs; control of trunk stabilizing muscles in sedation and in orthostasis; dynamic spine stabilization in multiple planes; orthostatic load support).

The training/treatment sessions lasted 60 minutes, 10 minutes of warm-up, 40 minutes of exercises on the floor and on the equipment and 10 minutes of cooling down. As a protective and monitoring measure, before and after each care session, painful perception was assessed using the Visual Analogue Scale (VAS). Blood pressure and heart rate were also collected using the HEM-7130 automatic arm blood pressure monitor (Omron Healthcare, Inc., Lake Forest, IL, USA). To verify the subjective perception of effort, the Borg scale (version 6 to 20 points) [28] was used after each session as a guiding instrument for maintaining and removing some exercise.

Participants were instructed not to participate in another therapeutic intervention during the same period. After the end of the twelve weeks of intervention, the individuals, from both groups, underwent a reassessment (post-intervention moment), containing the same procedures performed in the initial evaluation.

The physiotherapists who applied the protocol were not masked for randomization due to active supervision of the exercise intervention. However, the profes-

sionals were not informed about the stratification of the SBST in Medium or Low. It is noteworthy that the professionals who carried out the pre- and post-intervention evaluations did not participate in the interventions.

Statistics

The sample size to satisfy a statistical power of 80 % with 95% confidence was estimated by the computer program Bioestat (Civil Society Mamirauá, Tefé, AM, Brazil, Release 5.3, 2008) using data published by Silva et al. [29] who evaluated the effect of 12 sessions of the Pilates method in individuals with chronic low back pain. The minimum number of subjects per group, Control or Pilates, was of 12 individuals according to averages and deviations previously published standards.

The data were analyzed with the help of the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA, Release 16.0.2, 2008) after insertion through double typing with automatic amplitude and consistency check. Initially, homoscedasticity (Bartlett's criterion) and normality (Kolmogorov-Smirnov) of continuous data were verified. Two-way analysis of variance (ANOVA) with Bonferroni's post-hoc test was used to compare the results obtained between groups overtime. Categorical variables were summarized using absolute and relative frequencies with associations verified by Fisher's exact test. Correlations were calculated by the Pearson correlation coefficient and the effect size was established using Cohen's d. All statistical methods were two-tailed, P values were exact calculated and significance level was set as $P \leq 0.05$.

Results

In total, during the recruitment period, 408 questionnaires were answered from March to July 2019 by the interested people who answered the disclosure. It was identified that 78 (19.1%) of these individuals showed SBST Low, 153 (37.5%) SBST Medium and 177 (43.4%) SBST High. They contacted the 231 stakeholders with SBST Low and SBST Medium, and then subjected to evaluation pre-intervention the 120 individuals who did not have exclusion criteria at the time of initial contact. During the driving medical evaluation, 27 individuals did not meet the eligibility criteria, a fact that resulted in 93 patients eligible for research. These participants were randomized into the CG and PG groups (Figure 1). The evaluator was blinded to the allocation of treatment.

CG finished with 16 participants classified SBST Low (n = 4) and SBST Medium (n = 12) aged average (± Standard Deviation) 25.3 (± 5.4) years and 41.8 (± 9.7) years, respectively. Eight of them (50.0%) were single, seven (43.8%) were married and just one was (6.2%) divorced. As to education, seven (43.8%) participants had college graduates, seven (43.8%) had completed high school and two (12.4%) completed elementary school.

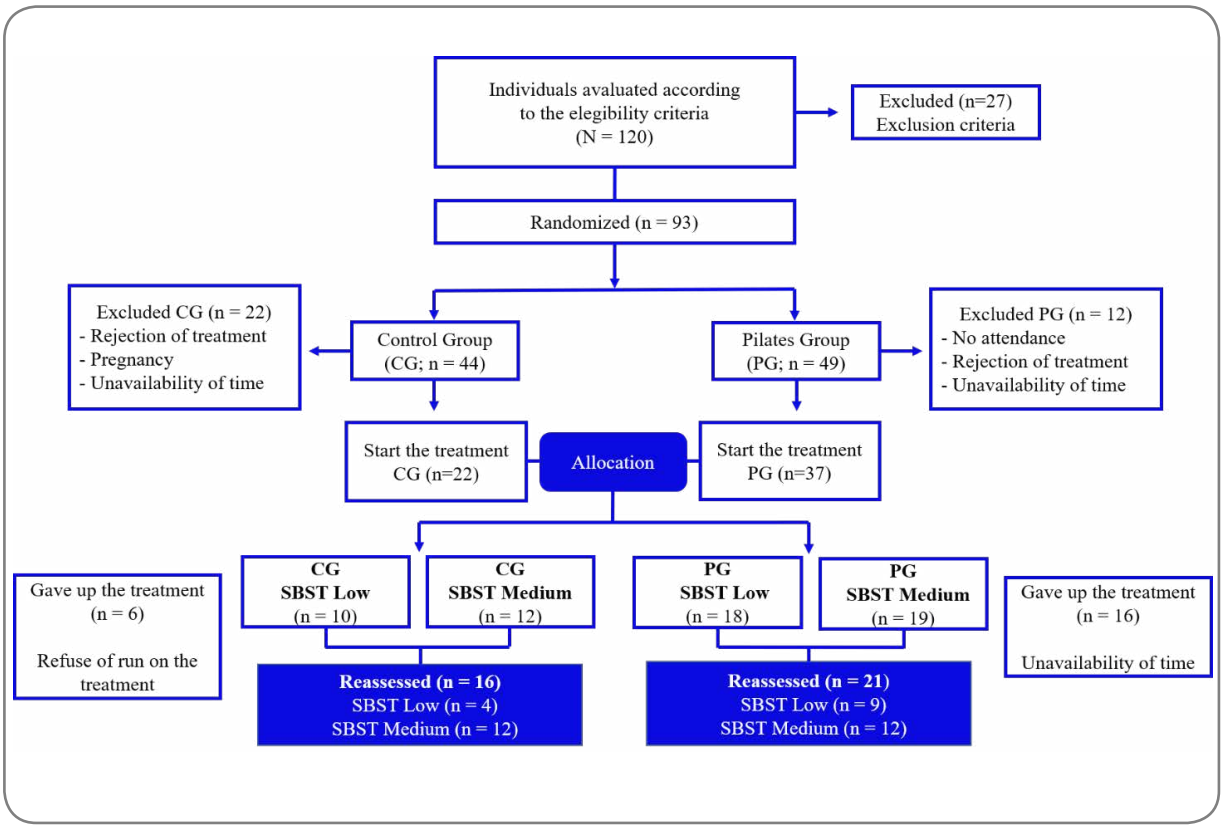

Figure 1 - Flowchart of randomization and allocation of individuals among the study groups

PG had nine (42.9%) volunteers classified with SBST Low and twelve (57.1%) with SBST Medium. Twelve (57.1%) were single, seven (33.3%) were married, one (4.8%) divorced and one (4.8%) widowed. The education of the group was characterized by seven (33.3%) participants with college education, 11 (52.4%) had completed high school and three (14.3%) with incomplete elementary education.

Regarding the work activities of the CG volunteers, 12 (75.0%) were formal professionals, with paid services, being three (18.8%) teachers, three (18.7%) general service workers and six (37.5%) exercising other professions related to their higher or technological education, one (6.2%) participant was an independent work and three (18.8%) were students. In the PG, 12 (57.1%) performed paid activities, being three (14.3%) teachers, four (19.0%) trade workers and five (23.9%) worked in other professions related to their higher education, five (23.8%) were independent professionals and four (19.0%) were students.

The table I presents the characteristics of participants in CG and PG stratified into subgroups Medium and Low according to the prognosis in primary treatment evaluated by the SBST-Brazil. Age, total body mass, height and BMI were similar between groups ($P > 0.05$)

Table I - Description of the sample (n = 37)

Variables	Control Grup (n = 16)		Pilates Grup (n = 21)		P
	SBTS Low (n = 4)	SBTS Medium (n = 12)	SBTS Low (n = 9)	SBTS Medium (n = 12)	
Age, years	25.3 ± 5.4	41.8 ± 9.7	34.7 ± 9.1	35.8 ± 12.0	0.053
Total body mass, kg	63.7 ± 14.1	80.1 ± 10.2	67.9 ± 16.7	76.3 ± 19.0	0.176
Height, meters	1.65 ± 0.08	1.67 ± 0.07	1.68 ± 0.11	1.63 ± 0.09	0.630
BMI, $kg.m^{-2}$	23.2 ± 2.8	28.7 ± 4.0	23.5 ± 3.9	28.3 ± 6.1	0.069

Data in mean and standard deviation; SBST: Brazilian version of the STarT Back Screening Tool

It was identified that there was no interaction effect with respect to pain sensation (F[3,33] = 1.506; P = 0.231) as the groups CG and PG, as well as any effect compared to group has been reported (F[3,33] = 1.787; P = 0.169). However, an effect on time (F[1.33] = 22.610; P <0.001) was observed. Additional comparisons showed that both subgroup SBST Low (4.8 ± 1.6 vs. 1.6 ± 1.8; P = 0.002 and d = 1.35) and the SBST Medium (6.1 ± 2.2 vs. 3.0 ± 2.0; P < 0.001 and d = 0.98) of the PG obtained a reduction in painful sensation. In other hand, no significant decrease was observed in CG (Table II). As the analysis of kinesiophobia was identified statistically significant effect only for the time (F[1,33] = 19.38; P = 0.001). In addition, there was a reduction in participants with low and medium SBST in the PG, however, in the CG only participants with average SBST showed a reduction in kinesiophobia levels. Finally, pain catastrophizing reduced only in participants with SBST Medium in the CG (4.8 ± 1.6 vs. 1.6 ± 1.8; P < 0.002 and d = 0.78). Furthermore, no interaction effect (F[3,33] = 0.280; P = 0.840) for the groups (F[3,33] = 0.769; P = 0.520) was found.

Tabela II - Intragroup and intergroup comparison of Control and Pilates treatments (n = 37)

Variables	Control Group (n= 16)		Pilates Group (n = 21)		Intergroup P-value
	SBTS Low (n=4)	SBTS Medium (n=12)	SBTS Low (n=9)	SBTS Medium (n=12)	
Pain	-0.55 (-1.35 / 0.35)	-1.92 (-3.10 / -0.73)	-3.22* (-4.69 / -1.75)	-3.08* (-4.79 / -1.38)	0.231
Functional incapacity	-0.50 (-1.60 / -0.60)	-1.83 (-5.81 / 2.14)	-3.00 (-6.11 / -0.11)	-3.75*# (-6.34 / -1.16)	0.727
Catastrophizing	-5.00 (-8.73 / -1.27)	-11.42* (-16.04 / 6.79)	-9.11 (-18.71 / 0.49)	-7.92 (-16.90 / 1.07)	0.840
Kinesiophobia	-1.50 (-5.07 / 2.07)	-6.83* (-8.96 / -4.71)	-6.67* (-9.93 / -3.41)	-7.08* (-12.32 / -1.85)	0.543

Data reported in mean differences between pre- and post-intervention with the 95% confidence interval. SBST: Brazilian version of the STarT Back Screening Tool; *P < 0.05 in relation to preintervention; #P < 0.05 in relation to post-intervention of SBST Medium from Control Group

Analyzing a possible relationship between the soreness and the different domains of pain catastrophizing in the preintervention, a positive correlation between pain and pain amplification was found (r = 0.52; P = 0.038), but at the end of the intervention the same association was not confirmed (r = 0.10; P = 0.716) in participants with SBST in the CG, suggesting a possible positive effect of the drug intervention.

Comparing the effects of the intervention on the functional capacity in relation to the CG and PG, was checked that no interaction effect happened (F[3,33] = 4.349; P = 0.7 27). However, were identified effects in relation to the groups (F[3,33] = 3.205; P = 0.036) and time (F[1,33] = 4.900; P = 0.03). Comparisons over time demonstrated that the intervention was effective in improving the functional capability of participants with SBST Medium in the PG (7.1 ± 4.5 vs. 3.3 ± 3.5; P < 0.05 and d = 0.78). In addition, when comparing the moments post-intervention between subgroups SBST Medium of CG and PG, also it was identified difference (P < 0.05) between them (Figure 2).

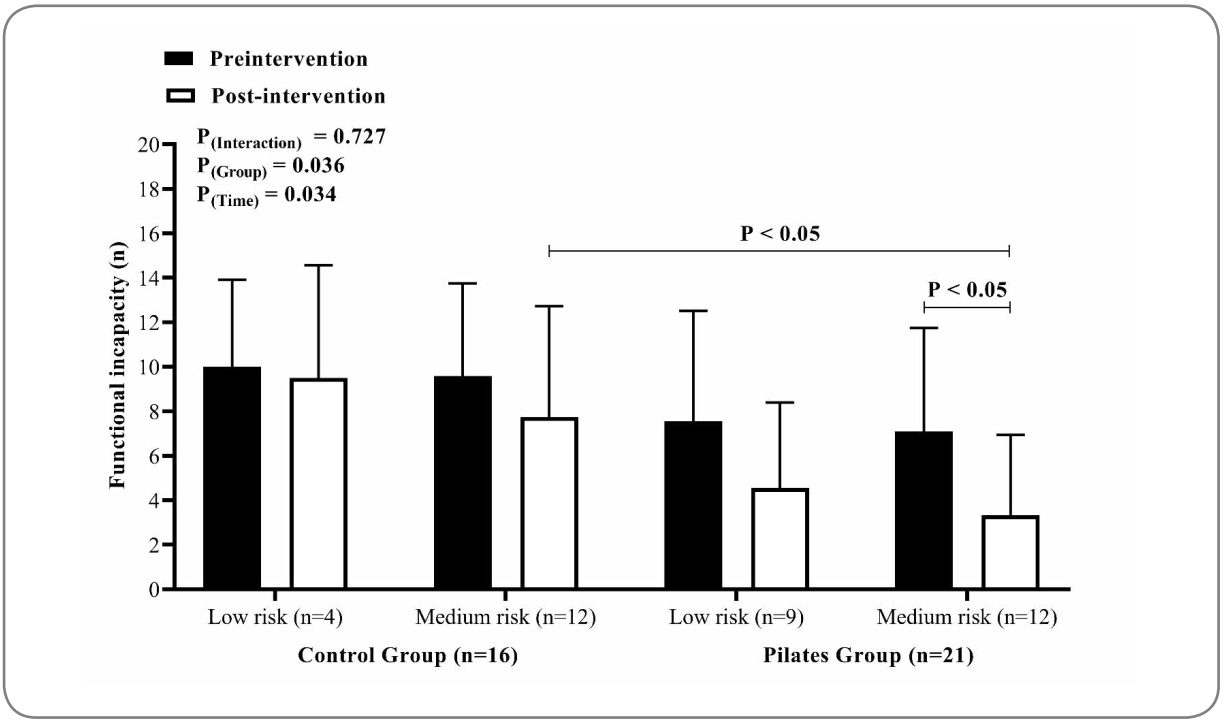

Figure 2 - Comparison of functional capacity by SBST subgroup in the two evaluation moments (pre- and post-intervention) from both groups (n = 37)

Discussion

The main findings indicate that training with the Pilates method reduced pain and kinesiophobia for both subgroups with low and medium risks of disability and that the PG SBST Medium achieved an improvement in functional capacity unlike the medium risk participants who received drug treatment. In addition, pharmacological intervention proved to be effective in reducing pain catastrophizing and kinesiophobia for the subgroup SBST Medium. The results point to the need for a risk classification for disability and pain catastrophizing prior to intervention as tools to aid therapeutic planning in individuals with CNLBP.

It was observed that strategies of classification of SBST and evaluation of pain catastrophizing were important tools for conducting interventions. It is observed that the CG had a positive association between the level of pain and the pain magnification (magnification of displeasure) pre-intervention, in other words, a possible

influence negative of aspects not only related to functionality. However, after the 12 weeks of pharmacological intervention, no association was observed. Therefore, the reduction of pain catastrophizing in CG SBST Medium may be related to the mechanism of action of the administered drug [26,27], this means that SBST Medium represents the presence of physical and psychosocial factors for the poor prognosis in the primary treatment for LBP [12].

Given this context, it is understood that the naproxen sodium has an analgesic action reducing the feeling of persistent pain, which makes it able to its direct interference in the reduction of pain magnification or exaggeration in valuing the threat it represents, even in the face of a non-significant clinical reduction in self-reported pain.

On the other hand, the lack of correlation between some of the domains of pain catastrophizing and pain perception in the participants of PG suggests that limitations functional can be involved in the pain mechanism besides the biopsychosocial aspects, especially for adults with CNLBP ranked as SBST Medium [12]. The results found for improving functional capacity and reducing pain for these participants support the rational presupposition of our study.

Taking into account that the painful perception and the presence of disabling conditions faced by individuals with CNLBP, such as fear-avoidance of pain [14], in addition to muscle weakness, especially in the deep abdomen muscles, and less articular flexibility in the spine and in the lower limbs [29,30], a possible interpretation to reduce pain and physical capacity limitations in the PG ranked as SBST Medium, is due to the fact that physical exercise is able to induce hypoalgesia, by activation of endogenous pain inhibitory systems [31]. In addition, the hypoalgesia exercise-induced improve general well-being, based on action on some psychological factors through multiple cellular and molecular events produced at different levels of the nervous system following physical exercise.

Regarding exercises based on Pilates method, they can act with functional reeducation improving the overall posture and breathing pattern of these individuals, as well as strengthening the deep trunk muscles and the static and dynamic stability of the muscles related to the lumbar segment, favoring an improvement in health-related quality of life and a better performance in activities of daily and professional life [29,31]. Treatment with Pilates method still has variability in the length of service and sessions, but it is noteworthy that there is evidence [31] showing that the frequency of twice a week seems to be better than once a week and have similar effects to training three times a week. Thus, in this research were prioritized two weekly 60-minute duration over 12 weeks, totaling 24 sessions [31-33].

The association between decreased functional capacity of muscles of core and the CNLBP may be one of the main defense arguments to use the Pilates method as a therapeutic intervention [32,34,35]. There is also evidence that people with CNLBP may demonstrate a prevalence of low pelvic loin control [36]. Current literature [37] recommends that patients in the low-risk group receive information about LBP and

have advice to remain as physically active as possible and to continue daily activities; medium-risk patients should have interventions based on the management of symptoms and physical function, in addition to information and advice, while high-risk patients, due to their greater limitations on recovery, should receive therapy based on a cognitive-behavioral approach, focusing on the psychosocial obstacles faced by them.

In view of the exposed, it is confirmed that the guidelines for non-pharmacological treatment of CNLBP emphasize the importance of participating in Pilates training programs [6,32,38,39]. Although it is expected, the intervention guidelines and literature reviews do not yet mention the comparison of the efficiency of the protocols in the face of minimal interventions and different classifications to the risk of poor prognosis [9,38,39]. It is emphasized that not only for ethical criteria, but also by comparison of the efficiency of Pilates method in reducing pain, provide improved functional capacity and daily activities, more therapeutic interventions compared to minimal intervention (pharmacological) are required.

As limitations of this study, it is noteworthy the low rate of adhesion to treatment with exercises, however, consistent with what is observed in current literature [40]. In addition, the highest dropout rate in the study was among patients with low SBST for both groups. One of the reasons reported for the withdrawals of the participants in the Pilates group was the unavailability of time, as well as the difficulty of traveling to the place where the appointments took place. It is speculated also that individuals with low SBST have low adherence to treatment due to an overestimation related to clinically acceptable minimum change. Future studies are required to evaluate this possible relationship.

Conclusion

The stratification in low and medium risks of poor prognosis in the primary treatment, according to SBST-Brazil tool, has positive responses to treatment based on Pilates exercises, considering the reduction in pain intensity and functional incapacity.

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Potential Conflict of interest
No conflicts of interest have been reported for this article.

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Authors´s contributions
Conception and design of the research: Antonelli BA, Angelo RCO, Schwingel PA. **Data collection:** Antoneli, BA, Nascimento LMS, Vasconcelos MDA. **Analysis and interpretation of data: A**ntonelli BA, Santos GA, Nascimento LMS, Vasconcelos MDA. **Statistical analysis:** Antonelli BA, Santos GA, Schwingel PA. **Obtaining financing:** Schwingel PA. **Writing of the manuscript:** Antonelli BA, Santos GA, Schwingel PA. **Critical revision of the manuscript for important intellectual content:** Angelo RCO.

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