

# Positive effects of a pain education program on patients with chronic pain: observational study

## *Efeitos positivos de um programa de educação em dor em pacientes com dor crônica: estudo observacional*

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Pain education is a tool that helps health professionals in the biopsychosocial approach and in pain management in patients with musculoskeletal pain. The objectives of the study were to verify the effects of a pain education program in patients with chronic musculoskeletal pain. The evaluated outcomes were pain, kinesiophobia, catastrophizing, quality of life, central sensitization and perception of the disease.

**METHODS:** Observational, retrospective study. Data from 24 participants with chronic pain, mean age 57 years, were analyzed, 83% of whom were female. Patients participated in a pain education program, which addressed topics such as acceptance, pain alarm, sleep, relaxation, negative thoughts, return to activities, relationships, and exercises.

**RESULTS:** Participants showed significant changes in the cognitive representation of the disease measured by the Illness Perception Questionnaire (Brief-IPQ) ( $p < 0.01$ ), central sensitization by the CSI ( $p = 0.05$ ), catastrophism ( $p < 0.05$ ), pain ( $p < 0.01$ ), physical aspects by the Short-Form Health Survey (SF-36) ( $p < 0.05$ ) and in the total score of the same Instrument ( $p < 0.05$ ).

**CONCLUSION:** The group applied pain education associated with usual physical therapy had significant effects in relation to the cognitive representation of the disease, central sensitization, catastrophizing and quality of life in patients with chronic musculoskeletal pain.

**Keywords:** Chronic pain, Health education, Physical therapy specialty.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A educação em dor é uma ferramenta que auxilia os profissionais de saúde na abordagem biopsicossocial e no manejo da dor em pacientes com dor musculoesquelética. Os objetivos do estudo foram verificar os efeitos de um programa de educação em dor em pacientes com dor crônica musculoesquelética. Os desfechos avaliados foram dor, cine-siofobia, catastrofização, qualidade de vida, sensibilização central e percepção da doença.

**MÉTODOS:** Estudo observacional, retrospectivo. Foram analisados os dados de 24 participantes com dor crônica, idade média de 57 anos, sendo 83% do sexo feminino. Os pacientes participaram de um programa de educação em dor, que abordou temas como aceitação, alarme da dor, sono, relaxamento, pensamentos negativos, retorno às atividades, relacionamentos e exercícios.

**RESULTADOS:** Os participantes apresentaram mudanças significativas na representação cognitiva da doença mensurada pelo *Illness Perception Questionnaire* (Brief-IPQ) ( $p < 0,01$ ), sensibilização central pelo CSI ( $p = 0,05$ ), catastrofismo ( $p < 0,05$ ), Dor ( $p < 0,01$ ), aspectos físicos pelo Questionário *Short-Form Health Survey* (SF-36) ( $p < 0,05$ ) e no escore total do mesmo instrumento ( $p < 0,05$ ).

**CONCLUSÃO:** A educação em dor aplicada em grupo associada à fisioterapia usual apresentou efeitos significativos em relação à representação cognitiva da doença, sensibilização central, catastrofização e qualidade de vida nos pacientes com dor crônica musculoesquelética.

**Descritores:** Dor crônica, Educação em saúde, Fisioterapia.

### INTRODUCTION

Currently, pain is described as “an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage”<sup>1</sup>. Chronic pain (CP) is related to persistent symptoms for more than 12 weeks<sup>2</sup>, which can lead to a decrease in mobility, alteration in flexibility, muscle strength, need for gait and posture adaptation, reduction in general functionality and often difficulties in the activities of daily living<sup>2</sup>.

CP is one of the major causes of disability in the world, affecting about 14.2% of the global population<sup>2</sup>. A recent study showed that CP affects about 39% of the adult population in Brazil<sup>3</sup>, generating important physical and emotional loss, in addition to socioeconomic impact, and is considered a public health problem<sup>2,3</sup>.

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Studies indicate that CP is frequently associated with other clinical symptoms, including fatigue, insomnia, cognitive deficits, headache, depression, and anxiety<sup>2</sup>, related to central sensitization (CS), in which there is a modification in the functional state of neurons due to intense or repetitive stimuli that provoke alterations in the pain threshold and cause hypersensitivity even in situations where there is no peripheral disease or nociceptive stimuli<sup>4</sup>, requiring, therefore, a multiprofessional approach<sup>3</sup>.

Pain education based on neuroscience<sup>5</sup> is a tool that helps health professionals in the biopsychosocial approach and management of these patients<sup>5,6</sup> and is capable of interfering in the perception of pain with coping strategies with the objective of altering beliefs, fears, and myths of the patient about pain<sup>7,8</sup>.

The intervention through Explain Pain<sup>9</sup> proposes the biopsychosocial model for CP treatment, with the objective of educating patients about the biology and physiology of pain and change the limited understanding of pain as tissue injury or disease into a marker that functions as a protective alarm.

Many actions that use pain education address information on the etiology and pathophysiology of pain, a knowledge that allows individuals to have a greater understanding of the causal and aggravating factors, interfering in social and economic issues that favor the patient's recovery. Therefore, teaching patients that pain does not always mean tissue injury allows them to control its intensity and brings benefits, such as improvement in function and quality of sleep, return to activities and practice of physical exercises<sup>10</sup>.

Pain education is a low-cost treatment modality that has been widely used<sup>6-8</sup>, but there is still a lack of studies investigating the effectiveness of this modality in patients with CP.

The objective of this study was to verify the positive effects of a Pain Education Program (PEP) in patients with recurrent CP of different etiologies.

## METHODS

Observational and retrospective study, conducted at the Therapy Center of *Associação de Assistência à Criança Deficiente* (AACD - Disabled Children Assistance Association) in São Paulo, from September 2018 to September 2019. Data was collected from the Tasy<sup>®</sup> electronic medical records of individuals who participated in the PEP, and the pain, kinesiophobia, catastrophizing, quality of life (QoL), CS, and disease perception outcomes were analyzed.

Adults of both sexes with medical diagnoses of low back pain, neck pain, scoliosis, hip and knee osteoarthritis, and rotator cuff tendinopathy were included in the study. Participants eligible for the program had CP for more than 3 months and reports of scattered and migratory pain that exceeded the 6-month time frame provided in the institutional rehabilitation protocols. Participants who did not have 100% attendance in the program were excluded from the study.

### Pain education program

The PEP was applied through face-to-face sessions using Microsoft PowerPoint<sup>®</sup> and explanatory videos on neuroscience availa-

ble on YouTube Google<sup>®</sup>. Sessions were composed of groups of 2 to 5 people, once a week, lasting 1h, before or after the physical therapy session.

The themes addressed in the PEP were acceptance, pain as an alarm, sleep, relaxation, negative thoughts, return to pleasurable activities, relationships, and practice of physical exercises, based on the script of education in pain prepared by *Grupo de Pesquisa em Dor* (Pain Research Group)<sup>11</sup>. The participants received support material containing information about the subject of the day and some exercises to consolidate each theme, which allowed them to live new experiences that would be commented on in the following week's session.

### Treatment associated with the pain education program

The PEP was associated with usual physiotherapy based on kinesiotherapy and stretching, strengthening, proprioception, body awareness and breathing exercises performed in 35 minutes sessions, twice a week for 7 weeks.

The participants were evaluated at the beginning and at the end of the program using the following questionnaires: Tampa Scale for Kinesiophobia (TSK), Short-Form Health Survey (SF-36), Central Awareness Questionnaire (BP-CSI), Illness Perception Questionnaire (Brief-IPQ), and the Pain Catastrophizing Scale (BP-PCS).

### Assessment instruments

The TSK is one of the most widely used instruments that assess kinesiophobia<sup>12,13</sup>. It's a self-administered questionnaire composed of 17 questions that address pain and intensity of symptoms. The scores range from one to four points, with the answer "strongly disagree" being equivalent to one point, "partially disagree" to two points, "partially agree" to three points, and "strongly agree" to four points. The final score ranges from 17 to 68 points, and the higher the score, the higher the degree of kinesiophobia. Its Brazilian Portuguese version had its measurement properties tested in individuals with chronic low back pain<sup>14</sup>. It showed an excellent internal consistency of 0.95 and an adequate intra-examiner reproducibility of 0.80.

In order to assess QoL in relation to physical, mental, psychological, emotional, and social well-being, the Brazilian version of the SF-36 was used<sup>15,16</sup>, composed of 36 items divided into eight topics: functional capacity, physical aspects, pain, general health status, vitality, social aspects, emotional aspects, mental health, and one more question comparing current health conditions to those of one year before. The score ranges from zero to 100, with zero being the worst general state of health and 100 the best. The Brazilian Portuguese version had its measurement properties tested in individuals with rheumatoid arthritis<sup>16</sup>. It showed moderate internal consistency between 0.30 and 0.50, satisfactory intra-examiner reproducibility between 0.44 and 0.85 and inter-examiner reproducibility between 0.55 and 0.81. Regarding the construct validity for the SF-36 components, functional capacity and pain were those that showed the highest correlation with the clinical parameters tested between 0.11 and 0.51 and 0.14 and 0.50<sup>15,16</sup>. The Central Sensitization Questionnaire (BP-CSI) consists of two parts, part "A" contains 25 items about symptoms present daily

or in most days in the last 3 months, which can be scored on a 5-point temporal Likert-type scale, and the higher the value, the higher the degree of CS, and can range from zero to 100 points in total. Part “A” evaluates the current health symptoms and part “B” evaluates whether the patient has been previously diagnosed with any of the diseases included in the central sensitivity syndrome, as well as the year of diagnosis<sup>17</sup>. This questionnaire was translated and adapted to Brazilian Portuguese<sup>18</sup> and had its measurement properties tested in individuals with CP<sup>19</sup>. It showed an excellent internal consistency of 0.91, intra-examiner reproducibility of 0.84 and inter-examiner reproducibility of 0.91.

Construct validity was moderate, ranging across the competing instruments from 0.62 to 0.68.

The Brief-IPQ is an instrument that provides an assessment regarding perceptions of diseases. It has nine items composed of a scale ranging from zero to 10 each. The items covered are related to cognitive assessment of the disease, emotional representation, and comprehension of the disease<sup>20</sup>. The scores range from zero to 80 and the higher the score, the greater the perception of threat of the disease. Its measurement properties were tested through exploratory factor analysis, in which two factors were extracted, the first denominated with an internal consistency of 0.80 and the second cognitive with a value of 0.52, therefore, good, and moderate internal consistency, respectively<sup>20</sup>.

The PCS evaluates the level of catastrophic thinking. It consists of 13 items graded in 5 points, in which the patient must mark the option that best describes his thoughts or feeling in relation to pain, where zero refers to minimum pain, 1 mild, 2 moderate, 3 intense and 4 very intense. The total score is obtained by adding all the items and can range from zero to 52. The higher the score, the higher the degree of catastrophizing. The instrument is composed of three subscales: hopelessness, magnification, and rumination<sup>21</sup>. It was translated and adapted into Brazilian Portuguese<sup>21</sup> and its measurement properties were tested in individuals with acute low back pain, with good intra-examiner (0.80) and

inter-examiner (0.75) reproducibility. Rash analysis showed adequate reproducibility coefficients of 0.95 for the items and 0.90 for individuals, showing that the scale is able to divide subjects into three levels of catastrophizing (mild, moderate, and high). Construct validity was weak to moderate with correlation between the competing instruments between 0.02 and 0.40.

This study was approved by the institution’s Ethics Research Committee involving human beings through opinion number 4.307.641, CAAE: 30009220.2.0000.0085.

**Statistical analysis**

The sample characteristics were analyzed descriptively. The effects of the PEP were tested using paired Student’s *t*-test and represented with measures of dispersion such as mean and standard deviation of the pre- and post-intervention data, the mean of the pre- and post-intervention period differences and confidence interval of the differences. Changes with *p*<0.05 were considered significant. All analyses were performed in the IBM SPSS Statistics Software<sup>21</sup>.

**RESULTS**

The data from 24 participants was analyzed, mean age 57±3 years, 83% were female, 50% had low back pain, 9% cervicgia, 21% hip osteoarthritis, 8% rotator cuff tendinopathy, 4% scoliosis, 4% knee osteoarthritis, and 4% other diagnoses. Seven participants who did not attend the program 100% were excluded.

The individuals who underwent the PEP presented significant alterations in the cognitive representation of the disease measured by the Brief-IPQ (*p*<0.01), central sensitization by the CSI (*p*=0.05), catastrophizing (*p*<0.05), pain (*p*<0.01), physical aspects by the SF-36 (*p*<0.05) and in the total score of the same instrument (*p*<0.05) (Table 1).

Kinesiophobia, assessed by the TSK, presented the results of 36.46 in pre-intervention and 35.83 in post-intervention, showing a slight

**Table 1.** Effects of the pain education program

Instruments	Before intervention	After intervention	Differences mean	CI 95%	
				Lower	Upper
TSK	36.46 ± 7.73	35.83 ± 11.39	0.62 ± 8.31	-2.88	4.13
Brief-IPQ	39.08 ± 9.18	31.54 ± 13.59	7.54 ± 9.89	3.36	11.72
CSI	41.46 ± 16.05	37.46 ± 15.32	4.00 ± 9.66	-0.08	8.08
Catastrophizing	23.42 ± 12.84	18.71 ± 14.34	4.71 ± 10.51	0.27	9.14
Functional capacity	40.63 ± 24.99	47.29 ± 25.32	-6.67 ± 18.33	-14.41	1.08
Pain	31.46 ± 13.21	45.79 ± 15.86	-14.33 ± 18.77	-22.26	-6.40
Vitality	49.42 ± 24.38	52.63 ± 20.99	-3.21 ± 18.86	-11.17	4.76
Emotional aspects	49.63 ± 42.89	60.58 ± 38.86	-10.96 ± 38.48	-27.21	5.29
Physical aspects	24.38 ± 29.02	40.29 ± 34.91	-15.92 ± 36.86	-31.48	-0.35
General health	59.92 ± 16.52	56.96 ± 22.48	2.96 ± 19.10	-5.11	11.02
Social aspects	51.75 ± 28.26	52.29 ± 28.77	-0.54 ± 31.42	-13.81	12.73
Mental health	59.83 ± 20.85	60.50 ± 23.95	-0.67 ± 16.75	-7.74	6.41
SF-36 total score	367 ± 126.41	416.33 ± 144.44	-49.33 ± 100.61	-91.82	-6.85

TSK = Tampa Scale for Kinesiophobia; CSI = Central Sensitization Questionnaire; Brief-IPQ = Illness Perception Questionnaire; SD = standard deviation; CI = confidence interval.

decrease in kinesiophobia, however, with no statistically significant difference. Regarding the perception of the disease, as assessed by the Brief-IPQ, the patients showed improvement, with a reduction from 39.08 to 31.54 after the intervention, a statistically significant result. Central sensitization, as assessed by the BP-CSI questionnaire, showed a reduction from 41.46 to 37.46 after the intervention. Catastrophic thinking also decreased significantly, with an initial score of 23.42 reduced to 18.71 after the intervention.

As for physical aspects, one of the SF-36's domains, the patients presented statistically significant results, developing from 24.38 to 40.29 after the pain education. QoL, measured by the SF-36, presented a statistically significant improvement with an increase from 367.00 to 416.33. The other analyzed outcomes didn't show statistically significant changes.

Figure 1 shows the mean pre- and post-intervention differences and the direction of all the instruments evaluated in the study.

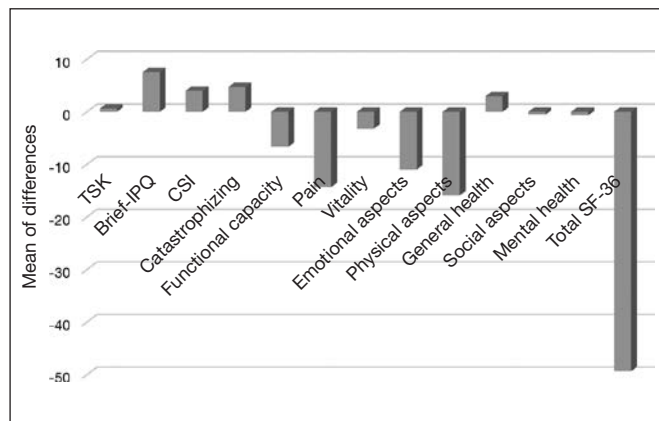


Figure 1. Mean of differences of all instruments assessed

## DISCUSSION

After the intervention, patients had significant changes in the outcomes of cognitive representation of the disease, CS, catastrophizing, pain, physical aspects, and QoL.

CP is a global issue that generates significant impact on people's lives leading to functional impairments, emotional problems, and high demand on health services with high impact on economy<sup>22</sup>. The comprehension of this condition is very complex when it comes to identifying the etiology and adopting the appropriate management, and despite the available pharmacological resources, many patients do not achieve the expected results<sup>23</sup>.

Most patients included in this study were women (83%). The data corroborates that of other studies, such as the review of studies on the prevalence of CP in the Brazilian population, which found a mean of 29.3 to 73.3%, with a predominance of female patients, mean age of 54 years old and with back pain as the most common complaint<sup>24</sup>.

Low back pain affects a significant part of the global population and has very heterogeneous characteristics, and there are several studies describing the biological, psychological, and social characteristics that explain the variations in the disease presentation<sup>25,26</sup>. There is high-quality evidence supporting the use of biopsychosocial interventions, focusing on active management strategies

that address psychosocial domains and physical function<sup>26-28</sup>. Pain Neuroscience Education (PNE) has been studied as a therapeutic resort since the late 1990s in different CP populations with the objective of modifying concepts and changing patients' knowledge about their pain condition<sup>9,29</sup> by addressing concepts about the neurophysiology of pain with the use of simple and didactic resources. This technique teaches people about the biology and physiology of their pain experiences, including information about CS, peripheral sensitization, allodynia, inhibition, facilitation, and neuroplasticity, among other subjects<sup>9,29</sup>.

Literature reinforces that pain education is a treatment modality that has been growing and becoming more popular, with evidence indicating positive results for catastrophizing, anxiety, disability, and movement restriction, corroborating the present study's findings, which found more significant effects for catastrophizing reduction and improvement of physical aspects<sup>29</sup>.

CP patients present important complaints regarding not only physical but also emotional conditions and, after pain education, they presented improvement in these outcomes, with significant change not only in the physical domains, but also in the cognitive representation of the disease, evidenced by satisfactory results in the assessment of the psychological condition and the reported level of pain. Scientific evidence indicates CS as an aggravating factor in patients with CP<sup>9,29</sup> and pain education teaches the patient about CS and its role in CP<sup>29</sup>. The face-to-face sessions together with graphic educational material, such as booklets, are effective to change the cognitive aspects related to pain and improve the health status in patients with several types of chronic musculoskeletal pain<sup>29</sup>. There was a significant reduction in the participants' CS in the present study, which associated with the other evidence was an important factor in the comprehension of the CP mechanism.

Although the benefits of exercise are well-established, many patients with CP present increased pain in response to this activity, which can predispose these individuals to physical inactivity and, in the long term, to disability<sup>30</sup>. When approaching these patients, it's important to have a broader view that enlightens them about the benefits of physical activity in order to reduce the feeling of threat they feel from practicing exercises.

A randomized clinical trial<sup>31</sup> concluded that pain education alone in the short term was more effective for pain and self-efficacy than the combination of pain education and group exercises for patients with chronic low back pain. A systematic review<sup>32</sup> pointed out that pain education techniques associated with the usual therapeutic interventions provide improvement of pain and disability in patients with CP. In the present study, the combinations of techniques showed satisfactory effects.

It's important that the therapists introduce the management of stress and exercise therapy in their biopsychosocial rehabilitation program, explaining these components of the treatment during the educational sessions and how they will contribute to reduce the central nervous system hypersensitivity<sup>29,30</sup>. Comprehending the neurophysiological and psychobiological bases of CP is crucial for the development of adequate and efficient strategies for the multidisciplinary assessment and treatment of pain, because it's been already showed that patients with CP present abnormal cerebral processing of body information and that negative



emotional states can significantly alter the brain's behavior and amplify the suffering related to pain<sup>33</sup>.

CP remains a global health problem, but there is still a lack of studies on pain education, as well as a lack of protocols and training for health care professionals to raise awareness of the multifactorial aspects involved<sup>34</sup>. Although interest in pain education and clinical training in developing countries has increased, restrictions from governments and health administrations represent a significant obstacle for practicing change<sup>34</sup>. For more than a decade, the International Association for the Study of Pain (IASP) has worked to reduce the negative impact of lack of pain education through funding and training programs in developing countries. The treatment of pain as a human right is an important moral goal underlying all IASP activities related to individuals who suffer from pain<sup>1</sup>.

Many actions that use pain education address information on the etiology and pathophysiology of pain, a knowledge that allows individuals to have a greater understanding of the causal and aggravating factors, interfering in social and economic issues that favor the patient's recovery<sup>10,35</sup>. Thus, teaching patients that pain does not always mean tissue damage enables better control of pain intensity, improved function and sleep, return to activities and encouragement to practice physical exercises<sup>35</sup>.

There are different methods of employing educational actions in the field of pain, involving booklets, explanatory videos, films, individualized meetings, group activities and lectures. Printed instruments are more used because they increase communication among the interested parties, promote standardization of the subjects approached and can be consulted whenever necessary<sup>36,37</sup>.

The study is a reflection for the professionals who assist patients with CP to improve their understanding of pain, neuroscience, and CS. It's important that there be more attention to the development of pain education projects that help patients understand, accept and deal with pain through breathing, meditation, practices that improve sleep quality, return to pleasurable activities and activities of daily living, ensuring the well-being, as well as improvement of functionality and QoL.

Among the limitations of the study is the fact that it's not a clinical trial that analyzes the effectiveness of the pain education program, but it demonstrates that the combination with usual therapy can be safe and promote changes in individuals with CP, and studies using the usual therapy as a control group in order to analyze the effectiveness of this combination are necessary. Pain education is an easily applicable tool, with good acceptance by the patients when they become aware of the multiple aspects that influence the sensation of pain<sup>38,39</sup>. This study reinforces the need for an approach focused on the biopsychosocial approach for the treatment of CP, which involves not only biomechanical or musculoskeletal alterations, but a wide set of dysfunctions that cause and maintain pain.

## CONCLUSION

Pain education applied in patients with musculoskeletal CP associated with usual physical therapy presented positives effects in relation to the cognitive representation of the disease, CS, catastrophizing, physical aspects and QoL.

## AUTHORS' CONTRIBUTIONS

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Project Management, Methodology, Writing - Preparation of the original, Writing - Review and Editing

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Data Collection, Writing - Preparation of the original, Methodology

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