Central sensitization and beliefs among patients with chronic pain in a primary health care unit

Sensibilização central e crenças entre pacientes com dores crônicas em uma unidade de atenção primária de saúde

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ABSTRACT

BACKGROUND AND OBJECTIVES: The pain that persists for more than three months is classified as chronic pain. Current studies suggest the existence of a dynamic relationship between biological changes, psychological state, and social context within the pain phenomenon and its chronicity. Central sensitization can be defined as the amplification of the neural signaling within the central nervous system that causes pain hypersensitivity, characterized by overlapping symptoms. The objective of this study was to evaluate the central sensitization, dysfunctional beliefs and other variables such as self-perception about sleep quality in a group of patients with chronic pain.

METHODS: The patients answered sociodemographic questions, questions about pain-related habits and beliefs, and completed the central sensitization questionnaire.

RESULTS: The 30 participants involved in the study had a mean value of 49.86±16.14 for central sensitization, as well as a high presence of dysfunctional beliefs and poor sleep self-perception.

CONCLUSION: The need for a biopsychosocial look aiming to investigate the beliefs and level of central sensitization of patients with chronic pain is becoming increasingly necessary, as it is essential to understand the socioeconomic conditions of each individual for better evaluation and management. An initial educational approach in an easy language that stimulated the reflection and participation of patients to understand their symptoms was well accepted by these patients.

Keywords: Chronic pain, Health education, Pain management, Primary health care.

RESUMO

JUSTIFICATIVA E OBJETIVOS: É classificada como dor crônica a dor que persiste por um período superior a três meses. Estudos atuais sugerem a existência de uma relação dinâmica entre mudanças biológicas, estado psicológico e contexto social dentro do fenômeno da dor e de sua cronificação. A sensibilização central pode ser definida como a amplificação da sinalização neural dentro do sistema nervoso central que provoca hipersensibilidade à dor, caracterizada pela sobreposição de sintomas. O objetivo deste estudo foi avaliar a sensibilização central, crenças disfuncionais e outras variáveis como autopercepção sobre qualidade do sono em um grupo de pacientes com dores crônicas de uma unidade de atenção primária de saúde.

MÉTODOS: Os pacientes responderam a questões sociodemográficas, questões sobre hábitos e crenças relacionadas à dor e preencheram o questionário de sensibilização central.

RESULTADOS: Os 30 participantes incluídos no estudo apresentaram o valor médio de 49,86±16,14 para sensibilização central, além de elevada presença de crenças disfuncionais e autopercepção ruim do sono.

CONCLUSÃO: A necessidade de um olhar biopsicossocial, que se proponha a investigar as crenças e o nível de sensibilização central de pacientes com dores crônicas se mostra cada vez mais necessário, assim como é fundamental compreender as condições socioeconômicas de cada indivíduo para melhor avaliação e cuidado. Abordagem inicial educativa, com linguagem acessiva, que estimula a reflexão e participação dos pacientes para a compreensão dos seus sintomas foi bem aceita pelos pacientes.

Descritores: Atenção primária à saúde, Dor crônica, Educação em saúde, Manejo da dor.

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INTRODUCTION

Pain that persists for a period longer than three months is classified as chronic pain (CP), and this definition is consistent with several widely used epidemiological references[1]. Current studies on CP suggest the existence of a dynamic relationship between biological changes, psychological status, and social context, emphasizing that these factors have different roles in CP, disability, and emotional maladjustment[2].

There is strong evidence that CP may be associated with physical disability, emotional disorders, and social difficulties. In addition, it has been recognized that emotional, cognitive, and social factors mediate the subjective experience of pain[3].

Physical pain, whether acute or chronic, is often reported along with anxiety and depression disorders[4-6]. Systematic reviews and recent cross-sectional studies have concluded that the combination of a depressive disorder, or anxiety disorder, with pain, is associated with a worse clinical outcome and increased use of the health system and health care costs than when pain is presented in isolation[7,8].

According to the biopsychosocial model of pain[9], the manifestation and maintenance of CP are dynamic functions of predispositions, stimuli, and preceptor responses and maintaining factors, variables that may include genetic factors, learning processes, and occupational factors. Preceptor stimuli can be external and internal and involve stressors and values capable of triggering several autonomic and musculoskeletal responses (e.g., sympathetic activation and muscle tension). Such responses are mediated by the perception and interpretation of physiological processes or symptoms and may involve expectations, learning processes, and beliefs, as well as coping strategies. Maintaining variables can be influenced by learning processes and other psychosocial factors. According to this model, biological aspects can initiate, maintain or modulate physical changes; psychological factors influence the assessment and perception of physiological signs, and social factors shape the patient's behavioral responses to the perception of his/her physical changes[9,10].

Recent reviews have highlighted the contribution of sleep disorders to the experience of pain[11,12]. Several studies indicate that sleep deprivation leads to a series of complications to general health, such as hyperalgesic responses in humans[13] and impaired function of the endogenous pain inhibition systems[14].

Biopsychosocial treatment that recognizes and targets the physical, psychological, and social factors underlying pain and disability is currently accepted as the most effective approach for CP[15,16] and superior to the usual treatment and isolated physical therapy[17].

The presence of CP is often associated with the presence of other clinical symptoms, including fatigue, poor sleep, cognitive deficits, headaches, depression, and anxiety[18]. A study[19] proposed the term "central sensitivity syndrome" (CSS-CS) to categorize inorganic pain-related disorders with overlapping dimensions of symptoms, with central sensitization (CS) being the common etiology. CS has overlapping symptoms in a spectrum of structural disease, from those with persistent nociception, for example, osteoarthritis, and those without physical tissue injury, such as fibromyalgia and myofascial pain syndrome[20].

Non-pharmacological strategies with the primary objective of reducing health costs associated with pain treatment and concerning its cost-effectiveness seem to be a great option for the implementation of pain understanding programs. These programs focus on a biopsychosocial approach in a multiprofessional way, concluding that it can be more economical for the health system, in addition to providing a better quality of life for people with pain[21] compared to the unilateral use of conventional medicine[22]. This study aimed to assess the emotional and mental health aspects linked to CS, dysfunctional beliefs and habits related to the perpetuation of CP and self-perceived sleep. Besides developing and conducting a Pain Education class based on neuroscience with accessible language, in a group, encouraging patients to participate in understanding what pain is, and reconceptualizing their symptoms, investigating their acceptability.

METHODS

A descriptive cross-sectional study with a brief educational intervention was carried out with patients with CP from a Basic Health Unit located in the city of Guarulhos in the state of São Paulo.

In a first contact, patients filled out questionnaires that subjectively assessed the level of pain felt, the impact of pain on daily activities, CS, and the beliefs and knowledge related to the care of musculoskeletal pain, and questions regarding the use of alcohol, tobacco, self-perceived physical activity, and sleep quality. They were also asked about the number of drugs in use for pain control, counting the prescribed and non-prescribed drugs. Neurological patients, polytrauma patients, or those with major functional deficits were excluded.

The Pittsburgh Scale (PSQI-BR) translated and validated for the Brazilian population[23], was used to assess sleep quality during the last month, which consists of a questionnaire with 19 items, and the first four questions that assess, in the previous month, the time they usually went to sleep; the time in minutes that they typically take to fall asleep; the time they usually wake up; the number of hours of sleep; and self-assessment of sleep quality.

The Central Sensitization Questionnaire (BP-CSI) was used to assess the degree of CS. The questionnaire was validated and translated into Portuguese, and it consists of two parts. Part A contains 25 statements that can be scored on a Temporal Likert scale of 5 points, from zero to four. The higher the value, the greater the degree of CS, which can vary from zero to 100 points in total. Part B assesses whether the patient has previously been diagnosed with any of the diseases included in CS syndrome and the year of diagnosis. Given the condition of the population studied, and the difficult access to specialist doctors, part B of the questionnaire was not used. However, health diagnoses with signs of CS were ruled out during the class of biopsychosocial aspects of pain[24].

To assess the intensity of pain in the previous week, the Numeric Rating Scale (NRS), from zero to 10, was used, where zero represents "no pain," and 10 represents "the worst pain imaginable." Also, on scales from zero to 10, patients rated how much pain interfered with their self-care activities, household chores, and outdoor activities, and how much they avoid leaving the house due to pain.

To assess some dysfunctional beliefs related to pain, patients responded yes or no to questions such as: when the pain increases, do you believe that it is your body that is "hurting more"?; "Do you believe that stress or anxiety can increase your pain"?; "Do you believe that exercises or movements can make your pain worse"?; "Do you believe that radiography and magnetic resonance imaging tests define your condition"?

After the assessment, the patients met in groups for the expository-participatory class on the neurophysiological aspects of pain and psychosocial factors that are related to the chronicity of pain.

The class lasted 1 hour and 30 minutes, with spaces for free exposure and questioning of patients, and was constructed in an easy language, using metaphors and common examples of how emotions play a central role in the painful experience. The purpose of the class was to stimulate reflection and reconceptualization, recognizing dysfunctional behaviors and thoughts related to the painful phenomenon.

Explaining pain, or educating about pain, refers to a range of educational interventions that aim to change the understanding of multiple aspects of pain, based on evidence, so that understanding is a pain reduction mechanism, based on educational psychology, in conceptual change strategies, to help patients understand the biology of pain. Pain education is not behavioral or cognitive counseling, nor does it deny the potential contribution of peripheral nociceptive signals to the experience of pain[25].

The application of the biopsychosocial model has focused on the impact of pain on the patient and those around him/her. The importance of psychosocial factors as mediators of suffering has been recognized in the literature, and several treatments and approaches recognize pain education as an effective strategy to modulate the factors that determine the painful experience[25].

At the end of the application of the questionnaires and the class on biopsychosocial aspects of pain, patients also responded, on visual scales from zero to 10, regarding the satisfaction to participate in this class and the importance of the theme. If the need for psychological support was observed, the patient was referred to the psychological support team.

After the class, the patients were individually scheduled for consultations and guidance with physical therapists on the best care and elaboration of conduct.

The Research Ethics Committee of Universidade Nove de Julho approved this study under CAAE opinion: 04098618.1.0000.5511, conducted from March to May 2019.

RESULTS

Thirty patients were included, with a total of 8 groups, with a mean age of 55.5±12.32 years old, 22 women and eight men. The regions with the highest number of CP complaints were the lumbar spine, followed by the knee and shoulder. The duration of pain complaints was 50.96±46.83 months (Table 1).

Among life habits, 93.3% of patients consider themselves to be sedentary, 44.4% live close to smokers. Fifty percent consider sleep quality poor, 26.66% very poor, with an average hour of sleep of 5.75±1.99. Other values about life habits and self-perception of sleep quality are shown in table 2.

Table 3 presents the values related to the level of pain and impact on daily activities using the numerical estimate scale from zero to 10, where the values found, both for the level of recent pain and the level of pain in indoor and outdoor activities, were high. The average score found with the application of the CS questionnaire was 49.86±16.14. Table 4 shows the values for the items in the CSS questionnaire that had a higher average score among the participants.

The volunteers answered the questions about pain-related beliefs with yes or no. Table 5 shows the answers.

Table 1. Sample characteristics (n=30)

Variables	
Age (mean±SD)	54.5±12.32
Gender (men / women)	8/22
Number of children (mean±SD)	3.23±2.11
Family income in number of minimum wages (R$ 998.00) (mean±SD)	1.64±0.73
Number of chronic pain complaints by location	
''All over the body"	4
Head	1
Neck	2
Shoulder	6
Lumbar spine	15
Knee	8
Upper limb	3
Lower limb	1
Painful complaint time (mean ± SD)	50.96±46.83
Drugs in use for pain prescribed (mean±SD)	1.33±1.39
Drugs in use for pain not prescribed (mean±SD)	0.56±0.50

Table 2. Life habits and self-perception of sleep quality

	n (%)
Sedentary (do not perform physical activity)	28 (93.3)
Smokers	3 (10)
Live close to smokers	13 (44.4)
Drink alcoholic beverages	5 (16.6)
Sleep quality self-assessment	
Very good	3 (10)
Good	4 (13.33)
Bad	15 (50)
Too bad	8 (26.66)
Total hours of sleep (mean ± SD)	5.75±1.99

Table 3. Values related to the level of pain and impact on daily activities according to the numerical estimate scale from zero to 10

	Mean±SD
Pain level felt in the previous week	7.96±1.99
How much pain disrupts your self-care	7.36±2.47
How much pain disrupts household chores	7.43±2.66
How much pain disrupts outdoor activities	7.63±2.39
How much you avoid leaving home due to pain	7.93±3.03

Table 4. Items of the central sensitization inventory with the highest score presented

Overall average score (zero-100)	Mean ± SD
Items with higher average scores	
2 - I feel my muscles are stiff	3.23±1.16
15 - Stress makes my symptoms worse	2.93±1.33
17 - I have little energy	2.89±1.04
18 - I have muscle tension in my neck and shoulders	2.80±1.24
12 - I sleep badly	2.63±1.37

Table 5. Dysfunctional beliefs related to pain

	% (n)	
	Yes	No
When the pain increases, do you believe that it is your body that is 'hurting more"?	96.60 (29)	3.40 (1)
Do you believe that exercise or movement makes your symptoms worse?	63.30 (19)	36.70 (11)
Do you believe that stress or anxiety can increase your pain?	80 (24)	20 (6)
Do you believe that imaging tests (e.g., radiography, magnetic resonance) can define and justify your condition?	93.30 (28)	6.60 (2)

At the end of the activity, the participants were asked about their satisfaction and about the importance of the theme for them, who responded on a Likert scale from zero to 10, with zero being negative/dissatisfied and 10 positive/satisfied. The average response for each item was as follows: 1 - How relevant do you think is the content of the class you attended? 9.80±0.48; 2 - What grade do you give for the way that this information was presented? 9.96±0.18; 3 - Do you consider it useful for other patients to know the content of this class? 9.80±0.80; 4 - Do you believe that understanding these facts will change the way you face your pain? 9.93±0.36.

DISCUSSION

Pain is an extremely prevalent symptom. A review of studies on the prevalence of CP in the Brazilian population found a range from 29.3 to 73.3%, affecting more women than men, and the most prevalent location was the dorsal/lumbar region[26].
The higher prevalence of CP in the elderly Brazilian population is significantly associated with being female, having less education, and worse economic status[27]. This socioeconomic influence also influences these people's resignation in reporting pain, and in their care[28]. In the studied population, the average age of patients with CP was 54.5±12.32 years old, most of them women, with an average family income of 1.64±0.73 minimum wages.
Among the behavioral aspects, 93.3% of the patients involved considered themselves to be sedentary, 44.4% live close to smokers, 50% consider the quality of their sleep bad, and 26.66% very bad. Higher prevalence of smoking was consistently observed in pain diagnoses, including fibromyalgia, back pain and headache, as well as physical inactivity and poor sleep quality, which contribute to a higher prevalence and worse outcome of chronic pain[13,14,27,29].
The largest number of complaints of CP was in the spine. In Brazil, the characteristics associated with the higher prevalence of spinal CP in both genders were increasing age, low education level, smoking history, high salt consumption, overweight and obesity, chronic diseases such as hypertension and high cholesterol[30]. Low back pain is heterogeneous in its presentation and its underlying mechanisms for the development and progression of symptoms. A vast literature describes biological, psychological, and social characteristics that explain individual variations in the presentation of the disease[31].

Among the biological aspects, variations in tissue disease, overload on tissues and structures by posture, muscle alignment, and activation, physical inactivity, pain neurology, central and peripheral changes in pain processing are implicated[32-34]. In the psychological domain, there is an equivalent diversity of associated factors such as the way the person deals with pain, self-efficacy, catastrophizing of pain, avoidance, kinesiophobia, depression, anxiety, anguish, and pain behavior, all having different implications within a treatment[35-37]. The social domain is equally diverse, including issues such as job satisfaction, support and social interaction[35,38].
CS can be defined as an amplification of neural signaling within the central nervous system that causes hypersensitivity to pain[39]. It corresponds to clinical diagnostic criteria where the pain complaint cannot be due to neuropathic pain due to injuries, neuropathy, diseases of the nervous system; or described as, for example, shooting, stinging, and not due to nociceptive or inflammatory processes such as pain proportional to the injury or identifiable inflammatory processes. Besides, it is necessary to have evidence of widespread pain and not just localized complaints, hypersensitivity to sensory processes in general, for example, sensitivity to light, sound, touch, odors etc., and symptoms that are a product and contributor to the construct "mental load" such as sleep problems, pain intensity, affective lability, cognitive difficulties and lack of energy and/or fatigue[40]. A set of symptoms commonly identified in patients with CP is the overlap of symptoms, including sleep disturbance, widespread pain, affective disturbance, cognitive disturbance and energy deficit[40,41].
The central sensitization inventory (CSI-BP) is a self-perception scale designed to alert health professionals that the symptoms presented by a patient may be related to some level of CS. The literature points out that the average scores on the CSI questionnaire in diseases with somatic characteristics are 40 points[42]. In this sample of 30 patients with CP, the average score on the CSI questionnaire was 49.86±16.14, with the questionnaire items with the highest score: 2 – "I feel my muscles are stiff"; 15 – "Stress makes my symptoms worse"; 17 – "I have little energy" 18 – "I have muscle tension in my neck and shoulders" and 12 – "I sleep badly." These findings show how much the overlap of multiple symptoms can be involved with the severity and impact of CP[43] among patients.
A study that analyzed the beliefs and attitudes related to chronic low back pain in the Brazilian population showed that the belief "physical injury" was the only one that presented a mean close to the desired orientation, that is, for these patients, pain is not necessarily related to a physical injury[43]. In this study, when asked whether they believe that when the pain is intense, their body is increasing, that is, connecting the pain to tissue injury, 96.60% of the volunteers reported that yes, so this direct relationship existed. When questioning the volunteers if they believe that stress or anxiety can increase and influence the painful experience, 80% responded yes, which was considered a desirable orientation. The three emotions most commonly associated with CP are depressed mood, anxiety and anger. These emotions, in turn, are associated with reduced pain thresholds, reduced pain tolerances and increased reported pain intensity[44-46]. However, this awareness

that emotions can influence the painful experience does not necessarily mean that they are aware of it, in order to try to modify or intervene in these emotional factors.

Fear of movement and other injuries may be a better predictor of physical functional limitations than the underlying biophysical or pathophysiological variables[47]. There is also strong evidence that the fear related to pain is more associated with the perceived disability and reduced behavioral performance than pain itself[48]. When asking the volunteers if they believe that exercise or movement makes their symptoms worse, 63.30% answered yes, characterizing fear related to movement.

When asked whether they believe that imaging tests such as radiography and magnetic resonance can define and justify their condition, 93.30% believe so, showing belief and dependence on imaging tests for diagnosis and prognosis by health professionals. Current studies point to the excessive use and reliance on imaging tests, which are often not accurate for establishing a diagnosis and correlating with the level of pain, including images in clinically healthy subjects[49-51].

The combination of education in pain with conventional forms of therapy is associated with improved function and pain in different populations[52-54]. So, the physical therapist's adequate knowledge is essential to act and guide the patient correctly.

The class on neurophysiological aspects of pain aimed to encourage reflection and reconceptualization of pain, recognizing dysfunctional behaviors and thoughts related to the painful phenomenon, in addition to clarifying myths in the care of CP for patients[55-58].

Both the content and the method of carrying out the activity were well accepted by patients who stated that the activity positively changed the way they see their health problem, in addition to considering it important that other patients with CP also receive the same guidance.

The limitations of this study were the difficulties of the service and the short time available for its execution, preventing further research on socioeconomic issues and the identification of other associated health comorbidities. Further studies on CP and its impact on vulnerable populations are needed, identifying the impact of low education, income and access to health services, and the extent to which these factors are determinant in the care of patients who complain of chronic pain.

CONCLUSION

The results reinforce the need for a biopsychosocial look at the management of chronic pain since the patient with CP does not present only biomechanical or musculoskeletal changes, but a broad spectrum of dysfunctions that cause and maintain pain. Pain education is a useful tool, with good acceptance by patients when they become aware of the multiple aspects that influence the painful phenomenon.

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