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Mindfulness interventions and pain management in a patient with encephalomyelitis

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ABSTRACT

Chronic pain is considered a common disabling disease, frequently related to a high comorbidity with anxiety and depression. Several psychological techniques have demonstrated to be effective in the treatment of chronic pain, in particular, mindfulness-based interventions (MBIs) seem to reduce pain acting on self-regulatory individual's ability. In addition, this approach could develop cognitive strategies to decrease impulsivity. We selected a case of a patient with encephalomyelitis and spastic tetraparesis to assess the application and effectiveness of MBIs to reduce pain perception, improve anxiety and depressive symptoms. Our treatment showed a reduction in pain perception, and an improvement in anxious and depressive symptoms. In conclusion, MBIs could be useful to relieve disorders related to pain in neurological patients.

1. Introduction

Chronic pain is considered a common disabling disease that affects about 1 in 10 adults each year [1], causing an important individual and social burden. The International Association for the Study of Pain defines it as "*an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage*" [2].

Pain involves sensory, cognitive and affective components. In the affective sphere, feelings of annoyance, sadness, anxiety and depression in response to a noxious stimulus have been reported [3,4]. Several studies [5,6] showed a high comorbidity between pain and depression. In particular, it seems that factors such as several pain sides, a longer disease duration and marked severity of pain, could significantly increase the risk of depression [7].

Cognitive and emotional factors play a critical role in pain perception and management [8]. Self-regulatory capacity, that is the ability to control internal or external, mental or physical activities, may influence chronic multi-symptom illnesses, representing a successful resource [9]. Several psychological models, such as insight-oriented therapies, behavioural and cognitive approaches, through the use of techniques including biofeedback, relaxation, guided imagery, hypnosis and meditation have demonstrated to be effective in the treatment of chronic pain [10]. Mindfulness-based interventions (MBIs) are some of the most important in this field, because physical pain or suffering are not avoided, but experienced and explored, becoming the object of meditation. Pain reduction is strictly related to cognitive strategies focused on suspending judgment, through the development of a particular kind of attention characterized by openness, curiosity, and acceptance of internal and external present experiences, allowing patients to act more reflectively rather than impulsively [11,12]. Several studies [13–15] have investigated the effectiveness of MBIs in the reduction of chronic low back pain, chronic migraine and headaches, and musculoskeletal pain. However, only a few studies [16,17] have reported the use and helpfulness of this technique in patients with severe neurological conditions, so the aim of this study was to examine, in a case of a patient with encephalomyelitis, the application and effectiveness of MBIs to reduce pain perception, improve anxiety and depressive symptoms.

2. Case report

We describe a 44-year-old patient, affected by encephalomyelitis and spastic tetraparesis. In January 2018, the patient was admitted to the emergency department because of a confusional state, torpor, weakness and paresthesia. A few hours later the clinical conditions worsened, with psychomotor agitation, respiratory failure and hypoxia. The patient was in a coma state for 13 days. Upon awakening, he

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showed severe motor deficits. Only mild cognitive deficits were detected, with particular involvement of sustained attention and short-term memory. In May, he was admitted to our center for neuro-cognitive and neuro-motor rehabilitative treatment. He complained of widespread pain and showed marked irritability. Drug therapy consisted of pregabalin, duloxetine and quietiapine.

Brain magnetic resonance imaging (MRI) showed hypointensity in left parietal region, compatible with the presence of hemosiderin. Positron emission tomography (PET) revealed marked and inhomogeneous reduction of the radiopharmaceutical distribution in cerebral cortical component of bilateral temporo-parietal regions, of frontal and occipital regions and cerebellum.

We also performed a neurophysiological study to evaluate the sensory and nociceptive system, applying the somato-sensory evoked potentials (SEPs) and laser evoked potentials (LEPs). Laser stimulus was applied to the dorsum of hand and feet; the electric stimulus was applied to the median and tibial nerve. LEPs examination showed an increase in latency (382–514 msec) and an amplitude reduction (12,5μv) of vertex complex N2/P2 at lower limbs, while parameters were normal in upper limbs. SEP's parameters showed a marked increase in latency (50 ms) and an amplitude reduction in cortical wave P400 while parameters were normal in upper limbs.

Initially, because of a low tolerance to frustration, the patient refused rehabilitative treatments. He showed marked oppositional behavior, with crying crisis and anger reactions to health professionals.

We performed a neuropsychological and psychological assessment. Raven Progressive Matrices [18], Rey Verbal Learning Auditory Test [19], Digit Span Test [20], Attentive Matrices Test [21] and Wisconsin Card Sorting Test [22] were administered to assess cognitive performances. Results showed a good cognitive performance (Table 1). Hamilton Rating Scale for Anxiety [23] and Beck Depression Inventory [24] were used to evaluate mood disorders, revealing significant levels of anxious and depressive symptoms. The visual analog scale (VAS) [25] and the multidimensional assessment of interoceptive awareness questionnaire (MAIA) [26] were applied to assess pain perception and the interoceptive body awareness (Table 2 and Table 3). VAS showed a severe intensity of pain perception. MAIA questionnaire highlighted an awareness of both uncomfortable, comfortable or neutral body sensations and also a good level of emotional awareness, that is the ability to recognize the physiological manifestations of emotions. Patient was worried about physical discomfort and had poor ability to regulate distress.

We applied a specific type of MBI program, the Mindfulness-Based Stress Reduction (MBSR), consisting of 8-week sessions (3 days a week, 1 h per visit). Mindfulness techniques included “Body scan” and “Mindfulness of breathing”. Body scan consists in paying attention to different parts of the body and to sensations in the present moment without any judgment. Mindfulness of breathing is an exercise focused on attending to breath and being mindful in the moment. The aims of this intervention were: reduction/acceptance of pain intensity, acceptance of feelings and possible handicaps, improvement in the quality of life.

At the end of the training, emotional and pain perception scales were administered. Results showed a reduction in anxious and depressive symptoms, and a significant reduction in pain perception (Table 2). MAIA questionnaire highlighted an improvement in the ability to sustain and control attention to body sensations and to regulate distress.

Table 1
Cognitive tests.

Test	Scores	Cut-off
Standard Progressive Matrices	31	≥15
Rey Auditory Verbal Learning Test - Immediate memory	49.10	≥28.53
Rey Auditory Verbal Learning Test - Delayed memory	9.50	≥4.69
Digit Span Test	4.50	≥3.75
Attentive Matrices Test	40.25	≥30
Wisconsin Card Sorting Test	22.5	≤90.50

Table 2
Emotional and pain perception scales.

Scale	T0	T1
Hamilton Rating Scale for Anxiety	25	13
Beck Depression Inventory - II	34	16
Visual Analog Scale	100	60

Table 3
Multidimensional assessment of interoceptive awareness.

Subscale	T0	T1
Noticing	4.5	4.5
Not-Distracting	2	2.6
Not-Worrying	2.3	3.3
Attention Regulation	3.14	4.28
Emotional Awareness	4	4.2
Self-Regulation	2.25	3.75
Body Listening	2	2.33
Trusting	5	5

3. Discussion

Chronic pain, such as other chronic diseases, may have a strong impact on individuals, affecting treatment adherence and symptom management [27]. MBSR is a systematic patient-centered educational approach focused on helping subjects to take better care of themselves and to live in a more adaptive way [28]. The significant evidence of comorbidity for anxiety and depression in patients suffering of chronic pain [29] highlights the importance to focus more on psychological treatments improving patients' self-management and coping skills. Interoception, defined as the multidimensional ability to sense the physiological condition of body, may represent an important factor of emotional processing and regulation [30]. A more precise detection of internal bodily signals allows to experience emotions more intensively, to process such signals and to regulate them [31]. Mental pathologies frequently impair self-regulation skills, like self-related processing, cognitive and impulse control. These characteristics in patients with chronic physical diseases are related to poor health outcomes [32].

Initially, our patient refused all rehabilitative treatments and he had poor pain tolerance. After the MBSR program we observed an increase in the ability to regulate attention and emotional reactions, with an improvement in pain tolerance and therapeutic collaboration. Emotional scales showed lower levels of anxious and depressive symptoms (Table 2). Several studies [33,34] demonstrated the efficacy of mindfulness training in enhancing chronic disease self-management, improving self-regulation abilities and modifying self-related processing.

This study has several limitations that should be taken into account. It is limited to a single case, so these important preliminary data must be addressed to larger samples, to explore the use of MBIs to reduce psychological symptoms and improve patients' compliance for rehabilitative treatments. Furthermore, when used in clinical practice, MBSR includes the application of other techniques, such as sitting and walking meditation, and mindful yoga. Because of the severe motor impairment of our patient, we could not apply the entire program. However, our results encourage the practice also of a limited set of interventions.

4. Conclusion

The current study shows encouraging preliminary evidence from the

use of MBIs in reducing pain perception, depressive and anxious symptoms in neurological patients. Recommendations for future research include the application of the intervention to larger and controlled samples and the evaluation of long-term improvements in outcome.

References

[1] D.S. Goldberg, S.J. McGee, Pain as a global public health priority, BMC Public Health 11 (1) (2011) 770.
[2] H. Merskey, N. Bogduk, Classification of Chronic Pain, IASP Task Force on Taxonomy, International Association for the Study of Pain Press, Seattle, WA, 1994.
[3] L. Doan, T. Manders, J. Wang, Neuroplasticity Underlying the Comorbidity of Pain and Depression, Neural plasticity, 2015 *2015*.
[4] F. Corallo, M.C. De Cola, V. Lo Buono, R. Grugno, G. Pintabona, L. Presti, Assessment of anxiety, depressive disorders and pain intensity in migraine and tension headache patients, Acta Med. Austriaca 31 (2015) 615.
[5] M.J. Bair, R.L. Robinson, W. Katon, K. Kroenke, Depression and pain comorbidity: a literature review, Arch. Intern. Med. 163 (20) (2003) 2433–2445.
[6] L.S. Williams, W.J. Jones, J. Shen, R.L. Robinson, M. Weinberger, K. Kroenke, Prevalence and impact of depression and pain in neurology outpatients, J. Neurol. Neurosurg. Psychiatry 74 (11) (2003) 1587–1589.
[7] M.M. Gerrits, N. Vogelzangs, P. Van Oppen, H.W. Van Marwijk, H. van der Horst, B.W. Penninx, Impact of pain on the course of depressive and anxiety disorders, Pain 153 (2) (2012) 429–436.
[8] V. Lo Buono, L. Bonanno, F. Corallo, L.R. Pisani, R.L. Presti, R.,. Grugno, S. Marino, Functional connectivity and cognitive impairment in migraine with and without aura, J. Headache Pain 18 (1) (2017) 72.
[9] L.S. Nes, C.R. Carlson, L.J. Crofford, R. de Leeuw, S.C. Segerstrom, Individual differences and self-regulatory fatigue: optimism, conscientiousness, and self-consciousness, Pers. Indiv. Differ. 50 (4) (2011) 475–480.
[10] D.C. Turk, K.S. Swanson, E.R. Tunks, Psychological approaches in the treatment of chronic pain patients—when pills, scalpels, and needles are not enough, Can. J. Psychiatr. 53 (4) (2008) 213–223.
[11] M.H. Majeed, A.A. Ali, D.M. Sudak, Mindfulness-based interventions for chronic pain: evidence and applications, Asian J. Psychiatr. 32 (2018) 79–83.
[12] A. Chiesa, A. Serretti, Mindfulness-based interventions for chronic pain: a systematic review of the evidence, J. Altern. Complement. Med. 17 (1) (2011) 83–93.
[13] N.M. Bakhshani, A. Amirani, H. Amirifard, M. Shahrakipoor, The effectiveness of mindfulness-based stress reduction on perceived pain intensity and quality of life in patients with chronic headache, Glob. J. Health Sci. 8 (4) (2016) 142.
[14] D.C. Cherkin, K.J. Sherman, B.H. Balderson, A.J. Cook, M.L. Anderson, R.J. Hawkes, J.A. Turner, Effect of mindfulness-based stress reduction vs cognitive behavioral therapy or usual care on back pain and functional limitations in adults with chronic low back pain: a randomized clinical trial, JAMA 315 (12) (2016) 1240–1249.
[15] C.A. Brown, A.K. Jones, Psychobiological correlates of improved mental health in patients with musculoskeletal pain after a mindfulness-based pain management program, Clin. J. Pain 29 (3) (2013) 233–244.
[16] A. Flores, M.M. Linehan, S.R. Todd, H.G. Hoffman, The use of virtual reality to facilitate mindfulness skills training in dialectical behavioral therapy for spinal cord injury: a case study, Front. Psychol. 9 (2018).
[17] E. Goodrich, H. Wahbeh, A. Mooney, M. Miller, B.S. Oken, Teaching mindfulness meditation to adults with severe speech and physical impairments: an exploratory study, Neuropsychol. Rehabil. 25 (5) (2015) 708–732.
[18] J.C. Raven, John Hugh Court, Raven's Progressive Matrices and Vocabulary Scales, Oxford pyschologists Press, 1998.
[19] M. Schmidt, Rey Auditory Verbal Learning Test: A Handbook (P. *1996*), Western Psychological Services, Los Angeles, CA, 1996.
[20] D. Wechsler, D.L. Coalson, S.E. Raiford, WAIS-IV: Wechsler Adult Intelligence Scale, Pearson, San Antonio, TX, 2008.
[21] C. Barletta-Rodolfi, F. Gasparini, E. Ghidoni, Kit del neuropsicologo italiano, Società Italiana di Neuropsicologia, Bologna, 2011.
[22] A. Puente, Wisconsin card sorting test, Test Crit. 4 (1985) 677–682.
[23] M.A.X. Hamilton, The assessment of anxiety states by rating, Br. J. Med. Psychol. 32 (1) (1959) 50–55.
[24] A.T. Beck, R.A. Steer, G.K. Brown, Beck depression inventory-II, San Antonio 78 (2) (1996) 490–498.
[25] D.D. Price, P.A. McGrath, A. Rafii, B. Buckingham, The validation of visual analogue scales as ratio scale measures for chronic and experimental pain, Pain 17 (1) (1983) 45–56.
[26] W.E. Mehling, C. Price, J.J. Daubenmier, M. Acree, E. Bartmess, A. Stewart, The multidimensional assessment of interoceptive awareness (MAIA), PLoS One 7 (11) (2012) e48230.
[27] O. Gureje, M. Von Korff, G.E. Simon, R. Gater, Persistent pain and well-being: a World Health Organization study in primary care, JAMA 280 (2) (1998) 147–151.
[28] P. Grossman, L. Niemann, S. Schmidt, H. Walach, Mindfulness-based stress reduction and health benefits: a meta-analysis, J. Psychosom. Res. 57 (1) (2004) 35–43.
[29] K. Rod, Observing the effects of mindfulness-based meditation on anxiety and depression in chronic pain patients, Psychiatr. Danub. 27 (Suppl 1) (2015) S209–S211.
[30] A.L. Solano López, S. Moore, Dimensions of body-awareness and depressed mood and anxiety, West. J. Nurs. Res. (2018) 0193945918798374.
[31] A.D. Craig, How do you feel? Interoception: the sense of the physiological condition of the body, Nat. Rev. Neurosci. 3 (8) (2002) 655.
[32] S. Moussavi, S. Chatterji, E. Verdes, A. Tandon, V. Patel, B. Ustun, Depression, chronic diseases, and decrements in health: results from the world health surveys, The Lancet 370 (9590) (2007) 851–858.
[33] Y.Y. Tang, L.D. Leve, A translational neuroscience perspective on mindfulness meditation as a prevention strategy, Transl. Behav. Med. 6 (1) (2015) 63–72.
[34] J. Sundquist, K. Palmér, L.M. Johansson, K. Sundquist, The effect of mindfulness group therapy on a broad range of psychiatric symptoms: a randomised controlled trial in primary health care, Eur. Psychiatry 43 (2017) 19–27.