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Effectiveness of yoga and educational intervention on disability, anxiety, depression, and pain in people with CLBP: A randomized controlled trial

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ABSTRACT

Objective: The current study investigates the effects of an 8-week yoga program with educational intervention compared with an informational pamphlet on disability, anxiety, depression, and pain, in people affected by chronic low back pain (CLBP).
Methods: Thirty individuals (age 34.2 ± 4.52 yrs) with CLBP were randomly assigned into a Yoga Group (YG, n = 15) and a Pamphlet Group (PG, n = 15). The YG participated in an 8-week (2 days per week) yoga program which included education on spine anatomy/biomechanics and the management of CLBP.
Main outcome measures: Monitoring response to intervention, the Oswestry Low Back Pain Disability Questionnaire (ODI-I), Zung self-Rating Depression Scale (SDS), Zung Self-Rating Anxiety Scale (SAS) and Numeric Rating Scale for Pain (NRS 0–10) were used to collect data.
Results: After intervention, the YG showed a significant decrease ($p < 0.05$) in the mean score in all assessed variables when compared with baseline data. In addition, statistically significant ($p < 0.05$) differences were observed among groups at the end of intervention in depression, anxiety, and pain, but not in disability.
Conclusions: The yoga program and education together appear to be effective in reducing depression and anxiety, which can affect perception of pain.

1. Introduction

Low Back Pain is a pain syndrome in the lower back region and may be classified by duration as acute (pain lasting less than 6 weeks), sub-chronic (6–12 weeks), or chronic (more than 12 weeks; CLBP) [1,2]. CLBP is a common health problem, and is also considered to be one of the most expensive medical conditions [3–6]. In 85% of cases of low back pain, diagnosis may be sought in non-specific vertebral-mechanical disorders [7–9]. The complexity of the origin of CLBP appears to be due to two main factors: a) mechanical-degenerative origin [10], evidenced by a clinical instrumental examination [11] as well as functional impairments [12,13]; b) non-mechanical origin, including neuroplastic changes in the central nervous system at the supraspinal level [14,15]. Growing evidence in the literature suggests that the symptomatology of CLBP can be exacerbated by psychological and psychosocial factors [16–18]. Among these psychological and psychosocial factors are the quality of life and personal emotions, which can influence posture and body signal awareness [18–20] which can increase perception of pain [21,22].

Feuerstein and colleagues [23] studied the interaction between psychological factors (i.e. general stress, perceived social climate, family and work environments, anxiety, depression, and perceived pain) in individuals affected by CLBP compared with healthy individuals. The authors observed that the CLBP group was

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characterized by a higher anxiety level and by depression, with an unstable social environment (family conflict/control). The authors reported that family and work environment data were more related to perceived pain than the general stress index, as well as that good family organization and independence were associated with less depression and anxiety. Hence, it appears that CLBP cannot be completely understood and managed without taking into account psychological and psychosocial factors at the same time [24].

Boutevillain and colleagues [25] reported three main factors that influence the overall health status of CLBP individuals: physical, psychological and socio-environmental. The authors observed that physical activity was difficult for them to include in everyday life due to several aspects, including psychological variables (i.e. motivation), socio-environmental variables (i.e. lack of time), and, mainly, the existing pain. Interestingly, the authors found that supervision/monitoring during physical activity had a great influence on patients' adherence to intervention.

In this context, interesting interventions, such as yoga, have proved to play a major role in reducing depression [26–28], anxiety [29,30], and stress [31] in adult individuals. Buttner and colleagues [32] found that yoga intervention reduced stress and depression levels in postpartum women affected by depression. Similarly, Streeter and colleagues [33] found that yoga intervention improved mood and decreased anxiety in the experimental group compared to their control counterparts, who only did walking exercise. In his longitudinal study, Brems [31] demonstrated that a 10-week yoga program (breathing, meditation, posture, for ≈90 min each session) significantly reduced the stress level in both university staff and students.

Emerging evidence suggests that reduction of stress, anxiety, and depression can help individuals with CLBP control and manage pain [34–36], and yoga intervention has been shown to be one of the most effective in reducing pain [37–39]. However, the mechanisms that lie behind these results are still unclear, and further research is needed. Chang and colleagues [40] suggested that yoga exercises can affect the individual's physical status and may stimulate the release of several hormones responsible for body well-being and energy, such as serotonin, cortisol, dehydroepiandrosterone, and the brain-derived neurotrophic factor [41,42]. As such, a possible decrease in pain level may appear in response to this type of exercise [43].

With regard to yoga training intervention, researchers demonstrated that seven days of a residential intensive yoga-based lifestyle program improved spinal flexibility in individuals with CLBP [44]. Some studies reported similar results in elderly women (50–79 years old) [45] and men [46]. Such intervention has also been demonstrated to reduce blood pressure and metabolic rate during rest, and to increase heart rate variability [47], with amelioration of the degree of motivation and psychological characteristics [48,49]. On the other hand, in order to improve the effectiveness of yoga interventions, it is important to include effective education about the illness itself and how to mentally manage it (i.e. patient education) [50–52].

Therefore, the purpose of this study was to investigate the role of a yoga program and education intervention in reducing disability, anxiety, depression, and pain in people with CLBP. We compared psychological outcomes with data from an informational pamphlet group based on the Zung questionnaires in participants suffering from anxiety and depression. We applied a particular yoga program, which included education on spine anatomy/biomechanics and the management of CLBP, based on contemporary yoga practices, suited to CLBP subjects, and including: a) static yoga posture to develop body awareness; b) short dynamic sequences to coordinate movement with breathing; c) meditation to train exploration of feelings and thoughts concerning the spine and basic anatomy/biomechanics.

2. Materials and methods

2.1. Participants

Thirty individuals (M = 16; F = 14) without previous experience in yoga/mindfulness/meditation practices participated in this study. They were randomly assigned to an experimental or yoga group (YG: M = 9, F = 6; mean age: 33.6 ± 4.30 yrs), or to a control group/pamphlet group (PG: M = 7, F = 8; mean age: 34.7 ± 4.83 yrs).

Inclusion criteria were: (1) pervasive CLBP, (2) adult age (≥18 years old), (3) depression and anxiety according to the Zung questionnaires. Exclusion criteria were: (1) acute low back pain (including recent thoracic-lumbar trauma), (2) specific causes of low back pain (lumbar stenosis, disc hernia, spinal deformity, fracture, spondylosis, osteoporosis of the spine), (3) current or preexisting neurologic, oncologic, or psychiatric conditions (e.g. dementia, Parkinson's disease, congenital central nervous system malformations, multiple sclerosis, tumors, schizophrenia, head trauma); (4) any previous experience in mindfulness, meditation, or yoga practice; (5) people with recent cerebrovascular accidents and myocardial infarctions; (6) obesity. Eligible participants were investigated for demographic and clinical characteristics (Table 1). Following intervention, yoga classes were offered to all the participants.

Statistical power analysis was carried out to calculate the sample size. Results showed that twelve subjects for each of two groups were required to achieve a statistical power of 80% (0.80), in order to detect a small effect (d = 0.30) when assessed by two-way repeated-measure analysis of variance (ANOVA) with a significance level of 5% (0.05).

2.2. Procedures

2.2.1. Yoga program and educational intervention

The YG participated in an 8-week yoga training program, two days per week. All sessions took place under the same conditions (room, light, and temperature ≈23 °C) and with the same expert. During the intervention, an expert in yoga – a 'yoga teacher' with substantial professional experience in treating posture and back problems – monitored the training sessions.

Sessions included contemporary yoga practices suited to CLBP

Table 1
Demographic and clinical data of all participants.

Age: Mean (min; max)	34.2 (25; 42)
Gender: male; female	16; 14
Occupation	
Employed	20
Self-employed	4
Domestic work	4
Non-employed	2
Education	
Elementary school	0
Middle school	3
High school	8
University education	19
Pharmacological therapy for CLBP	12; 9
Analgesic	6; 7
Muscle relaxant	8; 3
Both	3; 2
Comorbidities	NO
Physical/Physiotherapy therapy	10; 5
Sports	12; 7
Smoking	7; 9