Case-Control Study

Evaluation of Depression in Subacute Low Back Pain: A Case Control Study

Daniel López-López, PhD[1], Juan M. Vilar-Fernández, PhD[2], César Calvo-Lobo, PhD[3], Marta E. Losa-Iglesias, PhD[4], David Rodriguez-Sanz, PhD[5], and Ricardo Becerro-de-Bengoa-Vallejo, PhD[6]

From: [1]Department of Health Sciences, Universidade da Coruña Ferrol, Spain; [2]Modeling, Optimization, and Statistical Inference Research Group,Universidade da Coruña Ferrol, Spain; [3]Department of Nursing and Physical Therapy, Institute of Biomedicine, University of León, Ponferrada, León, Spain; [4]Universidad Rey Juan Carlos, Spain; [5]Department of Physiotherapy, Physical Therapy and Health Sciences Research Group, European University of Madrid, Villaviciosa de Odón, Madrid; [6]School of Nursing, Physiotherapy, and Podiatry, Universadad Complutense de Madrid, Spain

Address Correspondence:
Daniel López López, PhD
Universidade da Coruña ,
Campus Universitario de Esteiro s/n, 15403 Ferrol, A Coruña Spain
Email: daniellopez@udc.es

Background: Low back pain (LBP) is the most common musculoskeletal disorder affecting the general population and it is believed to be associated with depression.

Objective: The study aim was to describe and compare the impact in a sample of people with subacute LBP (SLBP) and patients without LBP with normalized reference values in the light of the scores obtained with regard using the Beck Depression Inventory (BDI).

Study Design: This was a case-control study.

Settings: Physiotherapist area at a care center.

Methods: A sample of 164 participants of a mean age of 41.45 ± 0.97 came to a physical therapy clinic where self-reported data were registered, informants' professional activity was determined, and the scores obtained were compared in the BDI.

Results: Total BDI scores at SLBP and their controls were 21.52 ± 6.93 (11 – 43) and 17.30 ± 5.09 (11 – 30), respectively ($P < 0.001$). The SLBP patient has 2.12 times more likely to have moderate depression (OR 2.12 (1.07 – 4.18) and 18.82 times more likely to have serious depression (OR 18.82 (1.06 – 331.81) compared to their controls ($P < 0.05$).

Limitations: The study was not a randomized controlled trial. Although primary outcome data were self-reported, the assessor was not blinded.

Conclusions: People with SLBP also have a significant increase in depression based on BDI scores, regardless of gender.

Key words: Depression, low back pain, musculoskeletal diseases

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Low back pain (LBP) is the most common musculoskeletal disorder with an estimated 80% incidence rate among the active population. It can cause chronic disabilities, reduced quality of life, emotional disorders, social cost, absenteeism from work, a negative influence on functional capacity, and other factors (1-7). This progression is multifactorial, complex, poorly understood, and it is sometimes accompanied by the presence of neoplasias; inflammatory and infectious diseases; systemic bone alterations; congenital abnormalities; degenerative, visceral, psychogenic diseases; traumas and mechanical causes (8-12).

This condition is recognized as a major public health problem, with the negative impact of LBP posing a significant burden on public and individual

health given the high incidence related to decreased efficiency and well-being in the working population, with consequent financial, medical, and socioeconomic implications affecting individuals, employers, and society at large (13-16).

On the other hand, several studies have suggested the existence of a relationship between emotional disorders and various musculoskeletal parameters (course, prognosis, frequency, and severity of crises, etc.), with anxiety and depression being the most commonly studied psychological variables in this context (17-20). LBP or lumbar pain runs between the lower ribs and the gluteus and is a condition in which a patient feels an incapacitating pain at the lower part of the back (21).

However, at present, there have been no studies that analyze the severity of depression taking into account its cognitive, affective, and behavioral dimensions and anxiety in people with subacute low back pain (SLBP). In this context, LBP is considered a predictor of lost independence, vulnerability, lack of protection, and loss of quality of life and welfare of the people (22-24).

Based on this background and taking into account the existence of unmet care and follow-up care of low back (25), our aim is to describe and compare the impact in a sample of people with SLBP and general population without LBP with normalized reference values.

Methods

Design and Sample

The study is a case-controlled observational study conducted in a physical therapy clinic, between October 2014 and October 2015. The inclusion criteria for case groups were patients of both genders, between 18 and 64 years, with a major complaint of SLBP lasting from 4 to 12 weeks (22). The exclusion criteria were acute pain lasting 2 – 4 weeks; recent back trauma; acute pathological fracture; pain irradiation to lower limbs with intensity equal to or greater than that of the back pain; neurological deficit in the lower limbs; active systemic neoplastic, infectious, or autoimmune diseases; prior surgery in the spinal column; refusal to sign an informed consent form and the inability to understand and carry out the instructions in the study; and patients of other nationalities (non-Spain) who did understand Spanish. In the control group, patients suffering with any type of pain, chronic or acute, diagnosed with psychopathology, on any psychotherapeutic drugs, or receiving any type of psychological management were

excluded. There was no remuneration for any of the participants. Seventy-one consecutive patients with a primary complaint of SLBP and 93 consecutive healthy participants who matched the inclusion criteria and agreed to participate were included.

Procedure

The measurements were carried out by a single physician who recorded participants' sociodemographic characteristics: age, gender, and weight and height, which were used to calculate body mass index (BMI).

Participants from both groups, then completed the 21-item Beck Depression Inventory (BDI). The internal consistency of the BDI shows a Cronbach's alpha coefficient of 0.85 (26) and it is a simple and effective tool for the detection and identification of depression symptoms (27). Symptoms evaluated by this questionnaire include 1) mood disorders; 2) loss of hope; 3) feelings of rejection; 4) inability to enjoy life; 5) feelings of guilt; 6) need for punishment; 7) hatred of self; 8) self-condemnation; 9) tendency to suicide; 10) tearfulness; 11) irritability; 12) disturbances in relation to others; 13) indecisiveness; 14) negative self-image; 15) disability for work; 16) disturbed sleep; 17) fatigue; 18) lack of appetite; 19) weight loss; 20) hypochondria; and 21) loss of libido. Each item is scored on a 4-point scale from 0 (little or no distress) to 3 (severe distress) and the total score is calculated by summing all items for a possible score of 0 – 63 (28). Scores between 0 – 10 indicate no signs of depression; 11 – 16 indicate mild depression; 17 – 20 indicate borderline depression; 21 – 30 indicate moderate depression; 31 – 40 indicate serious depression; and 41 or higher indicate extreme depression. Anything over 17 points requires professional treatment. (29).

It is a very simple and effective tool for the detection and identification of patients with symptoms of depression (30).

The degree of SLBP was assessed and categorized as present or absent for each patient based on their history, clinical findings, and response to treatment using The Quebec Task Force on Spinal Disorders (TQTFSD) (31,32) for which pain lasting 2 – 4 weeks is acute, up to 12 weeks is subacute, and more than 12 weeks is chronic (33). Controls were matched to cases according to age and gender attributes.

Ethical Considerations

The research was approved by the Research and Ethics Committee of the Universidade da Coruña

(Spain); record number: CE 23/2015. All volunteers gave written informed consent before inclusion in the study. In addition, the ethical standards for experimentation in humans as described in the Declaration of Helsinki (World Medical Assembly) and the Council of Europe Convention on human rights consent and biomedicine, the Universal Declaration of UNESCO on the human genome and human rights and appropriate national or institutional bodies were followed.

Statistical Analysis

Sample Size Calculation

The sample size was calculated with the software from Unidad de Epidemiología Clínica y Bioestadística, Complexo Hospitalario Universitario de A Coruña, Universidade A Coruña (www.fisterra.com). The calculations were based on proportion of depression in patients with chronic pain and healthy general population detecting between-groups differences of 25% (34), 2-tailed test, an α level of 0.05, and a desired power analysis of 80% with a β level of 20%. The estimated desired sample size was calculated to be at least 61 participants per group.

Descriptive analyses, including calculation of means, standard deviations (SD), and ranges were calculated for quantitative variables: age, weight, height, BDI, and BMI.

All variables were examined for normality of distribution using the Kolmogorov-Smirnov test, and data were considered normally distributed if $P > 0.05$. The variables showed not normally distributed, Wilcoxon test for independent variables was used to test for significant between-group differences between men and women and between LBP and non-LBP groups. A chi-square test was used to compare the qualitative variables.

The odds ratio (OR), its standard error, and 95% confidence interval are calculated according to Altman (35) and its test of significance, P-value is calculated according to Sheskin (36).

In all of the analyses, statistical significance was established with a P-value < 0.05 with a 95% confidence interval. All the analyses were performed with commercially available software (SPSS 19.0, Chicago, IL, USA).

RESULTS

A total of 164 people ranging in age between 18 and 64 years old completed the investigation. In the sample 71 (43.29%) patients were men and 93 (56.71%) women. The Kolmogorov Smirnov test showed a no normal distribution of all variables.

Table 1 shows sociodemographic characteristics of the study participants. The participants didn't show differences in age ($P = 0.711$) and showed significant differences in weight, height, BMI, and BDI ($P < 0.01$).

The Sociodemographic characteristics of the participants by presence of SLBP and control group are shown in Table 2 and there were no significant differences in age, weight, height, and BMI showing both homogenous groups.

The symptoms of depression that were evaluated with BDI in both groups are shown in Table 3. There were significant differences including higher scores of depression's symptoms in the SLBP group compared with the control group, and the most common symptoms of depression include: loss of hope, need for punishment, irritability, negative self-image, disturbed sleep, fatigue, lack of appetite, hypochondria, loss of libido, total BDI score ($P < 0.01$), and disability for work ($P < 0.05$). There were no significant differences between groups for mood disorders, feelings of rejection,

Table 1. *Sociodemographic characteristics of the sample by gender.*

	Total Group Mean ± SD Range N= 164 (100%)	Male Mean ± SD Range n= 71 (43,29%)	Female Mean ± SD Range n= 93 (56.70%)	*P* Value Male vs. Female
Age, years	41.45 ± 12.43 (19 – 65)	41.94 ± 12.32 (20 – 65)	41.07 ± 12.55 (19 – 65)	0.711
Weight (kg)	70.89 ± 13.18 (46 – 120)	79.47 ± 12.47 (53 – 120)	64,35 ± 9.45 (46 – 120)	0.001
Height (cm)	168.59 ± 8.75 (150 – 190)	175.47 ± 6.76 (162 – 190)	163.33 ± 6.02 (150 – 190)	0.001
BMI (kg/m²)	24.83±3.42 (16.26 – 36.23)	25.75 ± 3.37 (18.77 – 36.22)	24.12 ± 3.30 (16.26 – 36.22)	0.001
BDI	19.41 ± 6.28 (11 – 43)	18.12 ± 5.85 (11 – 40)	20.39 ± 6.46 (11 – 43)	0.010

Abbreviations: BMI, body mass index; SD, standard deviation, BDI, beck depression inventory. In all the analyses, $P < .05$ (with a 95% confidence interval) was considered statistically significant.

Table 2. *Sociodemographic characteristics of the participants with subacute low back pain (SLBP) and control.*

	Total Groups Mean ± SD Range N=164	SLBP Mean ± SD Range n= 82	Control Mean ± SD Range n= 82	*P* Value Male vs. Female
Age, years	41.45 ± 12.42 (19 – 65)	42.07 ± 12.28 (20 – 65)	40.82 ± 13.08 (19 – 65)	0.523
Weight (kg)	70.89 ± 13.18 (46 – 120)	70.52 ± 13.77 (46 – 120)	71.27 ± 9.02 (47 – 104)	0.716
Height (cm)	168.50 ± 8.75 (150 – 190)	167.32 ± 8.53 (150 – 188)	169.85 ± 6.47 (152 – 190)	0.064
BMI (kg/m²)	24.83 ± 3.42 (16.26 – 36.22)	25.05 ± 3.51 (18.73 – 36.23)	24.61±3.58 (16.26 – 35.05)	0.410

Abbreviations: SLBP, Subacute Low back pain; BMI, body mass index; SD, standard deviation, BDI, beck depression inventory. In all the analyses, $P < .05$ (with a 95% confidence interval) was considered statistically significant.

Table 3. *Distribution of the symptoms of depression in the total sample.*

Symptoms	Total Group Mean ± SD Range N= 164	SLBP Mean ± SD Range n= 82	Control Mean ± SD Range n= 82	*P* Value
Mood disorders	1.12 ± 0.36 (1 – 3)	1.14 ± 0.41 (1 – 3)	1.09 ± 0.38 (1 – 2)	0.392
Loss of hope	1.21 ± 0.46 (1 – 4)	1.30 ± 0.56 (1 – 4)	1.11 ± 0.31 (1 – 2)	0.006
Feelings of rejection	1.12 ± 0.37 (1 – 3)	1.13 ± 0.37 (1 – 3)	1.10 ± 0.37 (1 – 3)	0.532
Inability to enjoy life	1.31 ± 0.48 (1 – 3)	1.37 ± 0.50 (1 – 3)	1.26 ± 0.44 (1 – 2)	0.141
Feelings of guilt	1.13 ± 0.35 (1 – 3)	1.17 ± 0.41 (1 – 3)	1.09 ± 0.28 (1 – 2)	0.121
Need for punishment	1.13 ± 0.45 (1 – 4)	1.27 ± 0.61 (1 – 4)	1.00 ± 0.00 (1 – 1)	0.001
Hatred of self	0.34 ± 0.55 (0 – 3)	0.38 ± 0.62 (0 – 3)	0.29 ± 0.46 (0 – 1)	0.318
Self-condemnation	0.70 ± 0.71 (0 – 3)	0.76 ± 0.74 (0 – 3)	0.65 ± 0.67 (0 – 2)	0.324
Tendency to suicide	0.41 ± 0.55 (0 – 3)	0.45 ± 0.61 (0 – 3)	0.37 ± 0.49 (0 – 1)	0.323
Tearfulness	0.60 ± 0.83 (0 – 4)	0.71 ± 0.94 (0 – 4)	0.50 ± 0.69 (0 – 3)	0.108
Irritability	0.51 ± 0.60 (0 – 3)	0.63 ± 0.64 (0 – 3)	0.39 ± 0.54 (0 – 2)	0.009
Disturbances in relation to others	0.56 ± 0.66 (0 – 2)	0.61 ± 0.67 (0 – 2)	0.51 ± 0.65 (0 – 2)	0.343
Indecisiveness	0.23 ± 0.52 (0 – 2)	0.27 ± 0.52 (0 – 2)	0.18 ± 0.52 (0 – 2)	0.297
Negative self-image	0.64 ± 0.81 (0 – 3)	0.82 ± 0.90 (0 – 3)	0.46 ± 0.69 (0 – 3)	0.005
Disability for work	0.90 ± 0.88 (0 – 4)	0.76 ± 0.74 (0 – 3)	0.52 ± 0.65 (0 – 2)	0.035
Disturbed sleep	1.55 ± 0.68 (1 – 4)	1.21 ± 0.95 (0 – 4)	0.60 ± 0.69 (0 – 2)	0.001
Fatigue	1.18 ± 0.52 (1 – 4)	1.74 ± 0.77 (1 – 4)	1.37 ± 0.51 (1 – 3)	0.001
Lack of appetite	1.31 ± 0.79 (1 – 4)	1.29 ± 0.67 (1 – 4)	1.06 ± 0.24 (1 – 2)	0.003
Weight loss	1.24 ± 0.47 (1 – 3)	1.32 ± 0.80 (1 – 4)	1.30 ± 0.78 (1 – 4)	0.921
Hypochondria	1.24 ± 0.47 (1 – 3)	1.43 ± 0.57 (1 – 3)	1.05 ± 0.21 (1 – 2)	0.001
Loss of libido	1.59 ± 0.93 (1 – 4)	1.77 ± 1.01 (1 – 4)	1.40 ± 0.80 (1 – 4)	0.010
Total BDI Score	19.41 ± 6.28 (11 – 43)	21.52 ± 6.93 (11 – 43)	17.30 ± 5.09 (11 – 30)	0.001

Abbreviations: SLBP, Subacute Low back pain; SD, standard deviation, BDI, beck depression inventory. In all the analyses, $P < .05$ (with a 95% confidence interval) was considered statistically significant.

inability to enjoy life, feelings of guilt, hatred of self, self-condemnation, tendency to suicide, tearfulness, disturbances in relation to others, indecisiveness, and weight loss ($P > 0.05$).

According to the distribution of BDI, moderate depression was detected in 32 participant (39.02%) in the SLBP group and 19 participants (23.17%) in the group. Serious depression was detected in 8 participants (9.75%) and extremely pronounced depression was detected in one person (1.21%) in the SLBP group and none in the control group ($P = 0.049$).

The group with SLBP were 2.12 times more likely to have moderate depression (OR 2.12 [1.07 – 4.18 [$P = 0.029$), and 18.82 times more likely to have serious depression (OR 18.82 [1.06 – 331.81] $P = 0.45$) compared to their controls and these findings were significant differences as shown in Table 4.

DISCUSSION

Chronic LBP is common in primary care and guidelines recommend delaying referrals for physical therapy (37). In the general population, around 1/5 adults will report symptoms of low back pain (38). Previous studies have shown that chronic low back pain (CLBP) presents an association to a broad range of psychiatric disorders. Anxiety and depression typically are the most common (39-41).

The main objective of this study was to compare depression (assessed through the BDI scores) in patients with SLBP and general population without LBP with normalized reference values. So far, the epidemiological, clinical, and evolutionary variables that may influence the onset and development of SLBP have not been clearly defined (7). In addition, in our opinion, the severity or seriousness of SLBP may relate to emotional disorders such as depression.

To our knowledge there are no studies that demonstrate a relationship between the presence and severity of SLBP to the presence of depression. The results of this study confirm that patients with SLBP have a significant increase in BDI scores and therefore levels of depression. This is consistent with the findings of other studies linking depression to CLBP. These studies have demonstrated that depression negatively affects the course of the disease, symptoms, and response to treatment, and causes a significant increase in the use of health care services (42-45).

An association between CLBP and its influence on psychopathological variables has already been demonstrated by Maloney and McIntosh (46). They identified that veterans with CLBP had higher levels of stress and depression. The current study results are similar but are the first to describe how the presence and severity of SLBP influences the presence of depression in the general population. The BDI scores of the sample demonstrated that women with SLBP show significantly higher depression scores than men and when comparing both groups, the total BDI score (Table 3) shows that SLBP has a significant influence of having symptoms of depression. The present study revealed that the group with SLBP was 2 times more likely to have moderate depression and 18 times more likely to have serious depression than their controls. There was one person with extremely pronounced depression in the SLBP group. This did not show a significant difference but the results show a tendency toward increasing severity of depression when SLBP is present.

Depression was seen in a greater proportion of pa-

Table 4. *BDI classification of depression according to patients with subacute low back (SLBP) pain and control and odd ratio.*

Points, category	SLBP Mean ± SD Range N = 82	Control Mean ± SD Range N = 82	P Value	OR (95% CI)	P value
0 – 10, no signs of depression	0 (0%)	0 (0%)	0.049	N/A	
11 – 16, mild depression	22 (26.82 %)	42 (51.21 %)		0.35 (0.19 – 0.68)	0.001
17 – 20, depression	19 (23.17%)	21 (25.60%)		0.88 (0.43 – 0.1.79)	0.716
21 – 30, moderate depression	32 (39.02 %)	19 (23.17 %)		2.12 (1.07 – 4.18)	0.029
31 – 40, serious depression	8 (9.75 %)	0 (0 %)		18.82 (1.06 – 331.81)	0.045
over 41, extremely pronounced depression	1 (1.21 %)	0 (0 %)		3.03 (0.12 – 75.64)	0.498

Abbreviations: SLBP, Subacute Low back pain; BMI, body mass index; SD, standard deviation, BDI, beck depression inventory; OR, Odd Ratio. In all the analyses; N/A, None applicable, $P < .05$ (with a 95% confidence interval) was considered statistically significant.

tients with CLPB (34,47), emphasizing the importance of evaluation of the patients for generalized anxiety disorder, somatoform disorder, and for depression, and further research is need in SLBP population.

There are several limitations to the study that should be acknowledged. First, the study was not a randomized controlled trial. Although primary outcome data were self-reported, the assessor was not blinded. Also a more diverse (individuals from various countries) sample size would be beneficial to improve the strength of the study and identify more subcategories. In addition, expanding data collection to other countries may help to identify if there is a culture where this association does not exist and identify the mechanisms involved.

This highlights the need for further research on the presence and severity of SLBP (recognized as a public health problem) and how it influences the psychopathological variables in order to improve patients' physical and mental health.

Conclusions

This study provides further evidence that patients with SLBP have a significant increase in their BDI scores and therefore levels of depression regardless of gender. Clinically this can lead to a poor daily outlook and emotional state in patients with SLBP. These patients will need more psychological care in addition to any medical or physiotherapy treatment.

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