

# Depression in patients with chronic low back pain

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## Background

Low back pain is a common health issue affecting at least 80% of individuals during their lifetime. It is usually recurrent and develops into chronic low back pain (CLBP). In chronic pain, psychosocial risk factors become relevant, and may explain how individuals respond to pain. CLBP is often comorbid with depression.

## Aim

The aim of this study was to detect if there is an association between depression and functional disability in patients with CLBP.

## Patients and methods

This cross-sectional, descriptive preliminary study included 50 patients with CLBP. Pain intensity was measured using visual analogue scale (VAS), functional disability was measured using the Oswestry Disability Index (ODI), and depression assessment was done using Beck depression inventory (BDI) questionnaire II.

## Results

The mean age of the patients was 43.66±13.96 years. Mean scores for VAS, ODI, and BDI were 5.38±2.42, 18.66±7.26, and 22.40±9.20, respectively. A strong positive correlation was found between VAS and each of ODI and BDI ( $r=0.797$  and  $0.515$ , respectively;  $P=0.000$ ). Similarly, a positive significant linear relation was detected between degree of disability by ODI and severity of depression by BDI ( $P=0.039$ ).

## Conclusion

Depression strongly influences pain intensity and degree of disability in patients with CLBP. Screening and early management of depression is essential for reducing pain and disability associated with CLBP.

## Keywords:

depression, functional disability, low back pain

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## Introduction

Low back pain (LBP) is one of the most common medical problems involving any age worldwide. It is a leading cause of disability and interferes with quality of life and work performance [1]. The incidence of chronic low back pain (CLBP) has been reported to be 9–21% in the general population and has been increasing steadily [2]. As a result, disability associated with CLBP has been studied extensively, and psychosocial factors that may contribute to pain and disabilities have also been studied systematically [3].

CLBP and depression are two common problems that present in health facilities. LBP is a physical condition that usually presents with physical symptoms, whereas depression is a psychiatric condition [4]. The physical and psychological distress of chronic pain in association with individual and social vulnerability may precipitate an episode of major depression [5].

Pain and depression share biological pathways and nerve transmitters with treatment implications for

both conditions. Assessment and treatment of CLBP and depression simultaneously are necessary for better outcomes [6]. The explanation for this is that pessimistic thoughts activate some specific areas in the brain that cause the person to give more attention to the pain and increase the amplitude of pain felt [7].

## Aim

The aim of this study was to detect if there was an association between depression and functional disability in patients with CLBP.

## Patients and methods

This is a cross-sectional, descriptive and preliminary study, including 50 patients presenting with pain of at least 6-month duration and aged 20 years and above. A total of 25 patients were recruited for this study from

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Physical Medicine, Rheumatology and Rehabilitation outpatient clinic in Ain Shams University. All of the participants were informed about the nature of the study and its objectives, and those who agreed to take part signed the informed consent form. The study was approved by local ethical committee.

Exclusion criteria included patients with LBP of less than 6-month duration, those with back deformity, individuals who had previous back surgery, and those with systemic illnesses such as cancer, cardiac disease, chronic renal failure, and autoimmune diseases. Patients with primary psychiatric disorders such as depression, anxiety, or insomnia were also excluded. Moreover, patients with cognitive disability who are incapable of understanding and answering the questionnaire were excluded as well.

All patients were subjected to full history taking and clinical examination including back and neurological examination followed by plain radiography: lumbosacral spine, anterior–posterior view, and lateral view. Pain intensity measurement was assessed by the visual analogue scale (VAS).

Functional disability was assessed by the Oswestry Disability Index (ODI) [8]. Depression was assessed by the Beck depression inventory (BDI) questionnaire II [9]. The Arabic version was used for the study [10].

#### Statistical analysis

Data were entered and analyzed using the statistical package for the social sciences (version 15.0) (SPSS Inc., Chicago, Ill, USA). Qualitative data were presented as number and percent. The mean and SD were used as suitable statistical parameters to summarize the data. Tests of significance used for data analysis were the  $\chi^2$  test, which was for association or difference between categorical variables; independent  $t$  test, which was used for difference between two independent samples means; one-way analysis of variance, which was used for difference between more than two independent samples means; and Pearson's correlation coefficient ( $r$ ), which was used for the association between two

continuous variables. Results were statistically significant as follows:  $P$  value less than 0.05, significant and less than 0.01, highly significant.

#### Results

The present study was performed on 50 patients experiencing CLBP, which persisted for more than 6 months. Demographic data and clinical findings of the patients are shown in Tables 1 and 2, respectively.

Radiological findings are seen in Table 3, and mean pain scores, disability scores, and depression scores are shown in Table 4.

Figure 1 shows the pain intensity measurements using VAS 30% of patients had mild pain, 46% had moderate pain intensity, and 24% had severe intensity.

The results of simple linear correlations between different quantitative variables revealed VAS significantly correlated with the BMI ( $r=0.309$ ,  $P=0.029$ ). Similar finding was found between the age and VAS ( $r=0.442$ ,  $P=0.001$ ). A weaker positive correlation was found between the age and ODI ( $r=0.321$ ,  $P=0.023$ ), whereas a positive nonsignificant correlation was found between the age and BDI. A strong positive correlation was found between VAS and ODI ( $r=0.797$ ,  $P=0.000$ ). Finally, a positive moderate correlation was found between BDI and each of VAS and ODI ( $r=0.515$  and  $r=0.538$ , respectively;  $P=0.000$ ), as seen in Fig. 2.

As seen in Fig. 3, as disability scores increase, the depression scores increase as well. This correlation is highly significant ( $r=0.538$ ,  $P=0.000$ ).

A similar finding is present in Table 5, where most of the patients with severe disability had moderate to severe depression, 46.15 and 38.46%, respectively ( $P=0.039$ ).

On comparing disability with BMI categories of obesity, obese patients had higher disability ( $23.09 \pm 5.19$ ); however, this difference was not significant ( $P=0.853$ ) (Table 6).

**Table 1** Descriptive data of patients with chronic low back pain

Parameters	Mean $\pm$ SD	Minimum	Maximum
Age (years)	43.66 $\pm$ 13.96	20.0	71.0
Duration of back pain (years)	5.27 $\pm$ 6.20	0.5	30.0
BMI (kg/m <sup>2</sup> )	27.12 $\pm$ 3.69	19.0	33.1
Sex [n (%)]			
Male	25 (50.00)		–
Female	25 (50.00)		–

**Table 2 The clinical finding of the study sampled patients**

Parameters	n (%) (N=50)
Tender spine	42 (84.00)
Motor affection	11 (22.00)
Sensory loss	28 (56.00)
Para-spinal spasm	42 (84.00)
Back movements	
Limited flexion	24 (48.00)
Limited side bending	4 (8.00)
Limited side bending and flexion	15 (30.00)
Straight leg raising test	
Negative	16 (32.00)
Positive unilateral	26 (52.00)
Positive bilateral	8 (16.00)
Femoral stretch test	
Negative	25 (50.00)
Positive unilateral	23 (46.00)
Positive bilateral	2 (4.00)
Medication	
No	15 (30.00)
NSAID	11 (22.00)
NSAID and muscle relaxant	24 (48.00)

**Table 3 Lumbosacral radiological finding of the study sample patients**

Radiographic finding	n (%) (N=50)
One level disc space narrowing	22 (44.00)
More than one level disc space narrowing	10 (20.00)
More than one level disc space narrowing and spondylosis	8 (16.00)
Spondylosis	5 (10.00)
Spondylolisthesis	5 (10.00)

**Table 4 Mean results of visual analogue scale, Oswestry Disability Index, and Beck depression index for patients with chronic low back pain (N=50)**

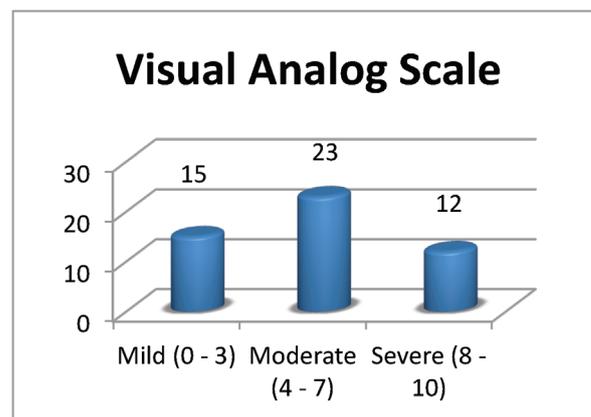
Parameters	Mean±SD	Minimum	Maximum
VAS	5.38±2.42	2.0	9.0
ODI	18.66±7.26	5.0	32.0
BDI	22.40±9.20	4.0	45.0

BDI, Beck depression inventory; ODI, Oswestry Disability Index; VAS, visual analogue scale.

Regarding the effect of occupation on disability, the manual worker got lowest disability score (15.42±5.93) and highest was seen office workers (22.83±8.11); in spite of this, the difference was not significant, as evident from Table 7.

## Discussion

CLBP and depression are the main causes of disability worldwide [11]. Thus, in chronic pain, psychosocial risk factors become relevant and are important to explain how individuals respond to back pain.

**Figure 1**

The distribution of the study sample patients according to VAS for pain intensity (n=50). VAS, visual analogue scale.

Recent studies have demonstrated that psychosocial factors are important risk factors for LBP [12].

The comorbidity between chronic pain and depression is clinically well established, but the underlying mechanisms are not well understood, though a potential explanation is disruption of the mesolimbic dopamine system [13]. Data from animal models indicate that regulation of dopamine activity in the ventral tegmental area mediates depressive response, suggesting a neurological link between depression and chronic pain [14].

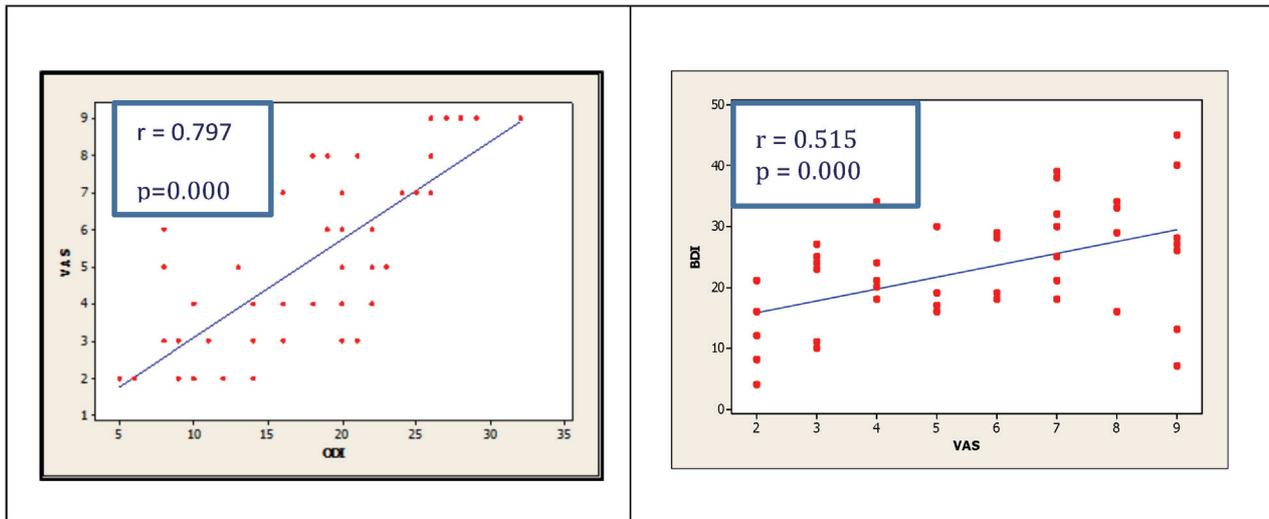
Because of the increased prevalence of psychological disturbance in patients with LBP, Carley *et al.* [15] reported that screening for depression should be routine in older adults with LBP. In spite of that, the mental state of most patients with CLBP is not routinely assessed.

The present study aimed to assess if there is an association between depression and functional disability in patients with CLBP. It included 50 patients with CLBP lasting for more than 6 months. Overall, 50% of our patients were males and 50% were females, and their mean age was 43.66±13.96 years.

Most of the patients (46%) presented with pain of moderate intensity. This is in accordance with a previous work by Stefane *et al.* [16] where most of the patients with CLBP presented with moderate intensity pain. However, Frost *et al.* [17] in their study of patients with LBP found that most of the patients presented with mild to moderate LBP score.

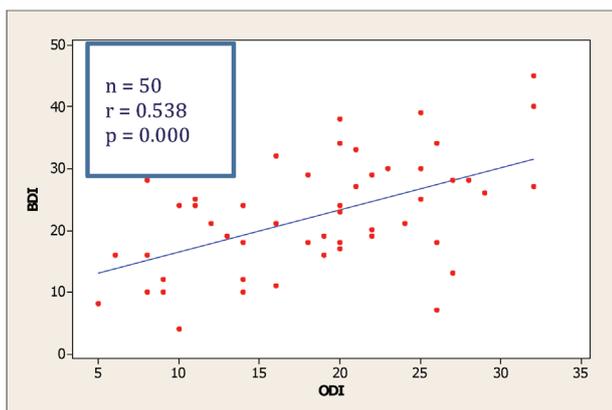
The mean disability score of the studied patients was 18.66±7.26 by ODI, where most of them had moderate

Figure 2



Scatter diagram showing the significant positive correlation between pain intensity on VAS and each of functional disability on the left by ODI and depression on the right by BDI ( $P=0.000$ ). BDI, Beck depression inventory; ODI, Oswestry Disability Index; VAS, visual analogue scale.

Figure 3



Scatter diagram showing positive significant linear relation between disability scores by ODI and depression scores by BDI. BDI, Beck depression inventory; ODI, Oswestry Disability Index.

(40%) disability and only 26% had severe disability. This finding is in accordance with previous works by other authors [18,19]. On the contrary, in the study by Stefane *et al.* [16], with the help of the Roland–Morris questionnaire, most of the patients with CLBP had severe disability. In this study, patients with highest disabilities were office workers compared with manual workers, which could be explained by the fact that active manual workers have better core stabilizing muscles and they exercise more often than those who are desk bound. A previous work on patients with fibromyalgia has shown that exercise decreases both pain scores and depression scores [20].

The present study revealed a significant positive correlation between pain intensity measured by VAS

and disability by ODI. This is in agreement with the work of Hung *et al.* [21]. Similarly, Ferrari *et al.* [22] found higher pain scores among patients with higher disability scores. This could be because of the fact that LBP chronicity is associated with changes in attitudes and body composition and in the way people move, load their backs, and respond to variety of motor and stable challenges [23].

In present work, we found a significant positive relationship between pain score by VAS and age. This agrees with the study by Robertson *et al.* [24] who found a significant association between older age and current LBP.

In this study, total disability score (ODI) significantly correlated with patient's age. This might be owing to aging process in addition to LBP intensity. This agrees with the work of Pinheiro *et al.* [5] who found an association between greater age and disability among patients with LBP.

Our study showed no association between age and depression in patients with CLBP. Similar findings were reported by Namgwa *et al.* [4]. However, in a Canadian general population study, age was found to have a significant effect on depression in patients with CLBP [24].

In this study, there was no relation between disease duration and pain intensity or disability. Similarly, Probst *et al.* [25] in their work on patients with chronic pain found no relation between disease duration and pain intensity, but they also observed

**Table 5 The effect of the degree of disability measured by Oswestry Disability Index on the severity of depression measured using Beck depression inventory**

BDI	ODI [n (%)]			Total	P value
	Mild	Moderate	Severe		
Normal	2 (11.76)	0 (0.00)	1 (7.70)	3 (6.00)	0.039 <sup>a</sup>
Mild	7 (41.17)	2 (10.00)	1 (7.70)	10 (20.00)	
Moderate	8 (47.06)	13 (65.00)	6 (46.15)	27 (54.00)	
Severe	0 (0.00)	5 (25.00)	5 (38.46)	10 (20.00)	
Total	17 (34.00)	20 (100.00)	13 (100.00)	50 (100.00)	–

BDI, Beck depression inventory; ODI, Oswestry Disability Index. <sup>a</sup> $\chi^2$  test was used.

**Table 6 Comparison between BMI categories and Oswestry Disability Index**

BMI categories (kg/m <sup>2</sup> )	n (%)	ODI (mean±SD)	P value <sup>a</sup>
Normal (18.5–24.9)	14 (28.00)	20.00±6.85	0.853
Over weight (25.0–29.9)	25 (50.00)	20.32±6.67	
Obesity (≥30)	11 (22.00)	23.09±5.19	

ODI, Oswestry Disability Index. <sup>a</sup>One-way analysis of variance test was applied.

**Table 7 The relationship between patient's occupation and the Oswestry Disability Index**

Occupation	n (%)	ODI (mean±SD)	P value <sup>a</sup>
House wife	18 (36.00)	20.83±7.52	0.069
Manual worker	14 (28.00)	15.42±5.93	
Office worker	12 (24.00)	22.83±8.11	
Long standing	6 (12.00)	17.08±6.50	

ODI, Oswestry Disability Index. <sup>a</sup>One-way analysis of variance test was applied.

that depressed mood significantly increased the effect pain exerts on disability in patients with chronic pain of long duration.

In this work, BMI significantly correlated with pain on VAS, whereas it showed a positive though nonsignificant correlation with disability by ODI. A previous work by Abou El-Soud *et al.* [26] has confirmed the highly significant association between LBP and BMI.

Obesity was found to be a risk factor for disability, whereas obese patients have a higher disability, with mean of 23.09±5.19. This could be explained by the fact that excess weight produces greater pressure on structures (intervertebral discs, nerve roots, inter-apophyseal joint, and interspinous ligaments) and cause pain. Other factors contributing to LBP in obese patients are flaccidity and abdominal wall distention, which prevents proper spinal support [27]. Moreover, lowered self-esteem owing to how different societies perceive patients with increased weight can add to disability.

In this work, more than half of the patients had moderate depression and 75% of them presented with moderate to severe depression. Our data are in agreement with Pawlowska *et al.* [28] who reported the

presence of depressive symptoms in 78% of their patients with LBP. In the recent work by Park *et al.* [29], depression was reported in 20.3% of Koreans experiencing LBP compared with 4.5% without LBP.

The prevalence of depression observed in the present work is somewhat higher than the average for other recent studies, and this could be owing to several factors, including methodological differences and socioeconomic factors.

In this work, a significant association was noticed between depression, pain, and disability in patients with CLBP. BDI significantly correlated with VAS and ODI. Moreover, it was found that as the degree of disability increased, the severity of depression is significantly increased.

Persistent LBP increases the risk of developing depressive symptoms [30] which has a negative effect on the course of recovery of LBP [31]. In the present study, none of our patients with mild disability had severe depression. At the same time, most of the patients with severe disability had moderate to severe depression. Hung *et al.* [21] found that depression was an important factor associated with disability among patients with CLBP.

Our results are supported by previous works of Kakpovi *et al.* [32] and Hiyama *et al.* [33] who observed depressive symptoms were significantly associated with LBP. On the contrary, Hülsebusch *et al.* [7] did not find a link between depression and pain intensity.

Depression may be a precursor to pain. Pain tolerance is decreased in major depression, and somatic

preoccupation can be a prominent symptom, especially in older people [33]. Another proposed mechanism is that chronic pain is a subtype of depression. Patients with LBP have a cycle of excessive fear of movement leading to deconditioning, further worsening pain, and further fear, termed fear avoidance, has been found to be more predictive of disability than pain intensity [34].

Serotonergic and nor-adrenergic neurotransmitters have been implicated in both pain and depression, and they share clinical pattern of persistence beyond the precipitant. Chronic pain and major depression may be associated when both arise out of a common underlying process [35].

Furthermore, patient's attitude and beliefs (especially fear avoidance) and passive coping strategies are considered as predisposing factors for disability and depression in CLBP [36].

As most of our patients presented with CLBP of mechanical origin and none of them presented with depressive symptoms before the start of LBP as observed in history and examination, we could hypothesize that CLBP could be a major precipitative factor for disability and depressive symptoms in our patients.

## Conclusion

In conclusion, depression strongly influences pain intensity and degree of disability in patients with CLBP. Preventing and treating depression is essential in patients with CLBP to reduce the effect of pain and disability. The use of antidepressant, such as selective serotonin release inhibitors, could be used as a part of integrated therapy of CLBP in patients with depression and functional disability.

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## Conflicts of interest

There are no conflicts of interest.

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