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The Relationship between Interventional Pain Treatment and Depression and Anxiety Levels in Patients with Chronic Pain Due to Lumbar Spine Pathologies

Lomber Omurga Patolojilerine Bağlı Kronik Ağrısı Olan Hastalarda Girişimsel Ağrı Tedavisi ile Depresyon ve Anksiyete Düzeyleri Arasındaki İlişki

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ÖZ

Amaç: Bu çalışmada, lomber omurga patolojilerine bağlı kronik bel ve bacak ağrısı olan hastalarda girişimsel ağrı tedavisinin depresyon ve anksiyete düzeyleri üzerindeki etkileri ile tedavi öncesi psikolojik durumun tedavi başarısına olan etkisi araştırılmıştır.
Araçlar ve Yöntem: Bu prospektif gözlemsel çalışmaya yaşları 18-80 arasında değişen, lomber omurga patolojisine bağlı kronik ağrı nedeniyle girişimsel ağrı tedavisi planlanan 88 hasta dahil edildi. Hastalara enjeksiyondan önce ve enjeksiyondan 6 hafta sonra Beck Depresyon ve Anksiyete Envanteri, sayısal derecelendirme ölçeği (NRS) uygulandı. Hastalar iki gruba ayrıldı: Enjeksiyon sonrası enjeksiyon öncesine göre NRS skorlarında %50 veya daha fazla düşüş olanlar (başarılı grup) ve %50'den az azalma olanlar (başarısız grup).
Bulgular: Hastaların enjeksiyon sonrası ortalama NRS skorları (3.28±2.27 (0-10) vs. 7.33±1.25 (5-10), P<0.001), depresyon skorları (9.14±7.06 (0-32) vs. 12.07)±9.58 (0-48), P<0.001) ve anksiyete puanları (8.98±8.13(0-41) vs.10.87±8.34 (0-33),P=0.018) enjeksiyon öncesine göre anlamlı derecede düşüktü. NRS puanlarında enjeksiyon öncesi ve sonrası değişiklikler ile depresyon ve anksiyete puanlarındaki değişiklikler arasında istatistiksel olarak anlamlı bir ilişki olduğu ortaya çıktı. Başarılı grupta enjeksiyon sonrası depresyon ve anksiyete puanlarındaki azalma anlamlı olarak daha yüksekti.
Sonuç: Lomber omurga patolojilerine bağlı kronik ağrısı olan hastalarda girişimsel ağrı tedavisi ile ağrının giderilmesi, hastalardaki depresyon ve anksiyete belirtilerini de azaltmıştır. Tedavi öncesi depresyon ve anksiyete düzeyleri ağrı tedavisinin başarısını etkilememiştir.

Anahtar Kelimeler: ağrı; ağrı tedavisi; anksiyete bozuklukları; depresyon; kronik ağrı

ABSTRACT

Purpose: We aimed to investigate the effect of interventional pain treatment on depression and anxiety levels in patients with chronic low back and leg pain due to lumbar spine pathologies. Secondly, we examined the effect of anxiety and depression level before treatment on pain success.
Materials and Methods: Eighty-eight patients aged 18-80 years, in whom interventional pain treatment due to chronic pain caused by lumbar spine pathology was planned were included in this prospective observational study. The Beck Depression and Anxiety Inventory, the numeric rating scale (NRS) were applied to the patients before and 6 weeks after injection. The patients were divided into two groups: those with a 50%or more decrease in the NRS scores after injection compared to the pre-injection (successful group)and those with a decrease of less than 50% (unsuccessful group).
Results: The patients' post-injection mean NRS scores (3.28±2.27 (0-10) vs. 7.33±1.25 (5-10), P<0.001), depression scores (9.14±7.06 (0-32) vs. 12.07±9.58 (0-48), P<0.001), and anxiety scores (8.98±8.13 (0-41) vs. 10.87±8.34 (0-33), P=0.018) were significantly lower compared to those before injection. A statistically significant correlation was revealed between the pre- and post-injection changes in the NRS scores and changes in depression and anxiety scores. The decrease in depression and anxiety scores after injection in the successful group was significantly higher.
Conclusions: Relieving pain with interventional pain treatment in patients with chronic pain due to lumbar spine pathologies also reduced depression and anxiety symptoms in the patients. Depression and anxiety levels prior to treatment did not affect the success of pain treatment.

Keywords: anxiety disorders; chronic pain; depression; pain; pain treatment

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INTRODUCTION

Pain represents an unpleasant sensory and emotional experience that is associated with or explained by tissue damage (existing or potential).[1] Pain is individual-specific in terms of localization, duration, and type and depends on the personal experience of each individual. Hence, to understand pain, it is necessary to understand its physical, psychological, and spiritual aspects.[2] Pain worsens the quality of life by impacting individuals' functions and then leads to social consequences by initiating the introversion process.[3]

Pain is classified as chronic if it persists for more than 3-6 months.[4] Chronic pain has a complex structure and impacts psychological, behavioral, and social factors.[5] Pain-related mental changes lead to numerous negative symptoms associated with cognitive, emotional, and behavioral disorders. In most patients, emotional stress manifests itself in the form of depression, anxiety, and anger.[3] Depression and anxiety are frequently observed in patients with chronic pain and have impacts such as impairing the quality of life and flow, affecting the outcomes of pain treatment, and increasing healthcare costs.[6] Studies have also demonstrated the correlation of pain with depression and anxiety.[7-9] It has been proven that depression increases the risk of chronic low back and neck pain in the general population.[10] On the other hand, pain is a strong indicator of depression when other variables are taken under control.[11,12]

Depression and anxiety symptoms are not adequately assessed in patients with chronic pain. It may be helpful to determine depression and anxiety states in treating patients with chronic pain for effective pain treatment. In the current study, we aimed to research the effect of interventional pain treatment on depression and anxiety levels in patients with chronic low back and leg pain due to lumbar spine problems and the effect of depression and anxiety levels prior to the procedure on the outcomes of interventional pain treatments.

MATERIALS and METHODS

The research was planned as a prospective and observational study. This study was approved by the Health Sciences University Samsun Training and Research Hospital Non-Interventional Clinical Research Ethics Committee (dated 09.09.2020 and numbered 2020/13/10) and patients signed an informed consent form. Patients aged 18-80 years, who presented to the algology clinic, had low back and/or leg pain due to disc herniation, facet arthropathy, and stenosis in the lumbar spine, were treated for interventional pain (interlaminar or transforaminal epidural injection), had pain for a minimum of 3 months, and had no previous history of psychiatric illness, were included in the study. The exclusion criteria were determined as patients who had previous surgery in the lumbar region, those with a history of malignancy, those using anticoagulants, pregnant patients, those who had an inflammatory, infectious or autoimmune disease, and those who had undergone any interventional pain treatment in the last 3 months. The Beck Depression Inventory and the Beck Anxiety Inventory were applied to the patients before and 6 weeks after injection. The patients' pain intensity was determined using the numeric rating scale (NRS, 11-point pain scale, 0=no pain, 10=the worst pain imaginable) before and 6 weeks after injection. The patients were divided into 2 groups; those with a 50% and more decrease in the NRS scores after injection were assigned to the successful group, and those with less than a 50% decrease were assigned to the unsuccessful group.

Beck Depression Inventory

It represents a 21-item self-assessment scale measuring the severity of depression. It evaluates the cognitive, somatic, and behavioral symptoms of depression. The total score ranges from 0 to 63. The scores measure minimal, mild, moderate, and severe symptoms (0-13=minimal depressive symptoms, 14-19= mild depression, 20-28=moderate depression, 29-63= severe depression).[13]

Beck Anxiety Inventory

It is a 21-item self-assessment scale evaluating anxiety-related cognitive, somatic, and behavioral symptoms.[14] It represents a Likert scale scored between 0 and 3 (0=none, 3=severe). Patients choose how much each symptom disturbs them. The total score varies between 0 and 63. By

evaluating the total score of patients, it indicates the severity of anxiety symptoms as minimal, mild, moderate, and severe (<10 points=normal, 10-18= mild anxiety, 19-29= moderate, and 30-63 points are classified as severe anxiety).[15]

Statistical Analysis

Statistical analyses of the data obtained in our study were performed using the SPSS (Version 22, SPSS Inc., Chicago, IL, USA) software. Descriptive statistics of categorical data were presented as numbers (n) and percentage (%). Chi-square test or Fisher's exact test was used depending on the sample sizes in the crosstab cells to compare the ratios between categorical variables. Descriptive statistics of numerical data were presented as mean±standard deviation (SD) or median (min-max) in accordance with the assumption of normal distribution. Shapiro-Wilk or Kolmogorov Smirnov tests were used to determine whether the data fit a normal distribution. In the comparison of two related numerical data (pre-post), the paired t test was used when the parametric test assumptions were met, and the Wilcoxon signed rank test was used when they were not. Mann Whitney U test was used to compare numerical data between two independent groups. P<0.05 was chosen as the statistical significance.

RESULTS

The data of a total of 88 patients, 38 (43.2%) males and 50 (56.8%) females, were analyzed in the study. The patients' mean age was 49.1±13.64 (20-79).

No statistically significant correlation was found between the patients' pre-injection NRS scores and the pre-injection depression and anxiety scores (*P*=0.460, *P*=0.188, respectively, Table 1).

Table 1. Correlation analysis results between pre-injection NRS scores and pre-injection depression and pre-injection anxiety scores (n=88).

Variables		Pre-injection depression score	Pre-injection anxiety score
Pre-injection NRS score	r	0.080	0.142
	P	0.460	0.188

Spearman's rho correlation coefficient, NRS: Numeric Rating Scala, P<0.05 was chosen as the statistical significance level

The patients' post-injection mean NRS scores (3.28±2.27 (0-10) vs. 7.33±1.25 (5-10), P<0.001), depression scores (9.14±7.06 (0-32) vs. 12.07±9.58 (0-48), P<0.001), and anxiety scores (8.98±8.13 (0-41) vs. 10.87±8.34 (0-33), P=0.018) were significantly lower in comparison with pre-injection values (Table 2).

Table 2. Statistical findings for the comparison of pre- and post-injection NRS, depression and anxiety scores.

Variables	Pre-injection Mean±SD (min-max)	Post-injection Mean±SD (min-max)	P values*
NRS	7.33±1.25 (5-10)	3.28±2.27 (0-10)	**<0.001**[a]
Depression scores	12.07±9.58 (0-48)	9.14±7.06 (0-32)	**<0.001**[b]
Anxiety scores	10.87±8.34 (0-33)	8.98±8.13 (0-41)	**0.018**[a]

[a]Paired t-test, [b]Wilcoxon signed rank test, NRS: Numeric Rating Scala, SD: Standard Deviation, *P<0.05 was chosen as the statistical significance level.

A statistically significant weak correlation was found between changes in the NRS scores and changes in depression and anxiety scores (r=0.271, *P*=0.011; r=0.285, *P*=0.007, respectively, Table 3). Figure 1 shows the regression curve and 95% confidence interval, along with the scatterplot demonstrating the relationship between the changes.

Table 3. Correlation analysis results between changes in NRS scores and changes in depression and anxiety scores before and after the injection (n=88).

Variables		The change in pre-injection and post-injection depression scores	The change in pre-injection and post-injection anxiety scores
The change in pre-injection and post-injection NRS scores	r	0.271	0.285
	P	**0.011**	**0.007***

Spearman's rho correlation coefficient, NRS: Numeric Rating Scale,*P<0.05 was chosen as the statistical significance level.

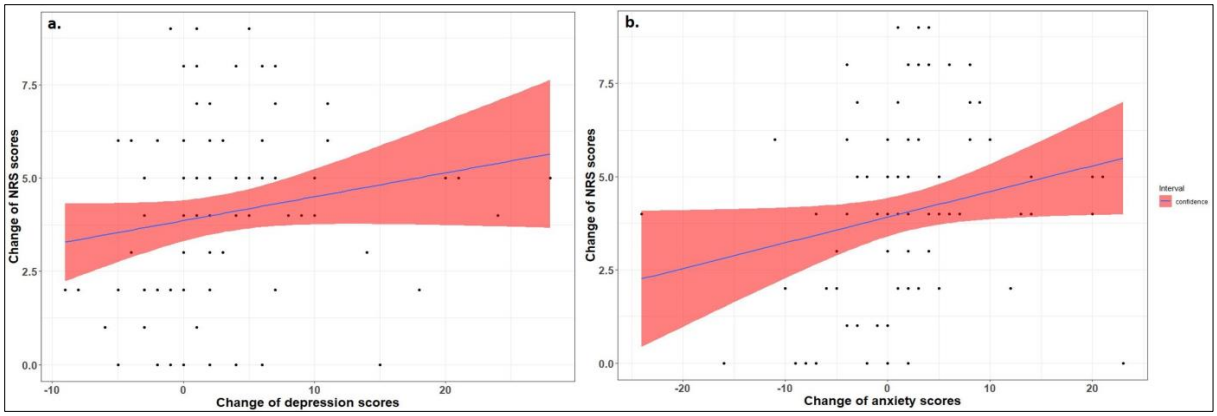

Figure 1. Scatter plot with regression curve showing the relationship between pre- and post-injection NRS score changes and depression and anxiety score changes.

The patients were divided into two groups; those with a 50% and more decrease in the post-injection NRS scores compared to the pre-injection values were assigned to the successful group, and those with less than a 50% decrease were assigned to the unsuccessful group. The pre-injection depression and anxiety scores did not differ statistically between the groups (*P*=0.635, *P*=0.737, respectively, Table 3).

The decrease in the post-injection depression and anxiety scores in the successful group was significantly higher than the decrease in the depression and anxiety scores in the unsuccessful group (*P*=0.002, *P*=0.033, respectively, Table 4).

Figure 2 presents the boxplot demonstrating the change in pre-injection and post-injection depression and anxiety scores between the groups.

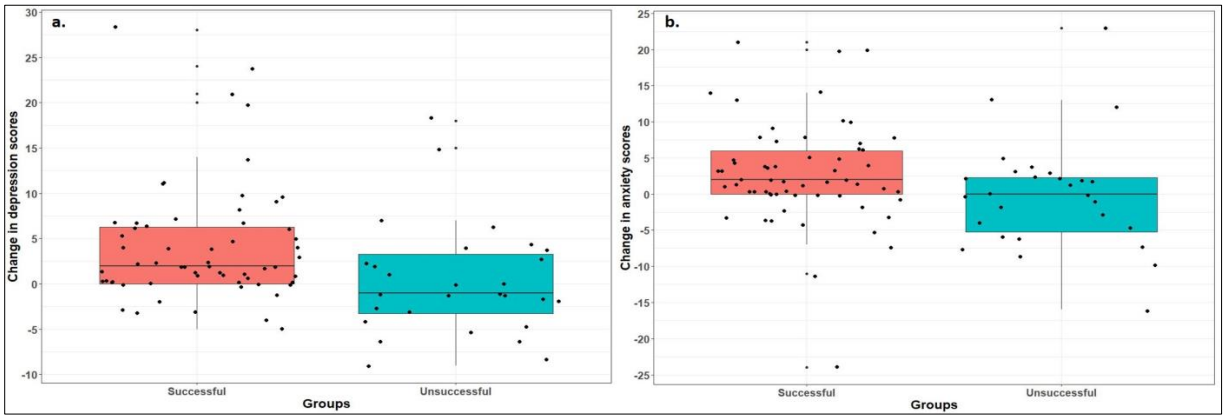

Figure 2. Box plot showing the changes in pre-injection and post-injection depression and anxiety scores between groups with NRS change above and below 50%.

Table 4. Statistical findings for the comparison of changes in pre-injection depression and anxiety scores with pre-injection and post-injection depression and anxiety scores among groups with NRS change of less than 50% and more.

Variables	NRS 50% change groups		P values*
	Successful (n=60)	Unsuccessful (n=28)	
Pre-injection depression	11 (0 & 48) (12.57±10.20)	9 (0 & 30) (11.00±8.18)	0.635
Pre-injection anxiety	9 (0 & 31) (11.22±8.75)	9.5 (1 & 33) (10.14±7.49)	0.737
The change in pre-injection and post-injection depression scores	2 (-5 & 28) (4.15±6.53)	-1 (-9 & 18) (0.32±6.11)	**0.002**
The change in pre-injection and post-injection anxiety scores	2 (-24 & 21) (2.83±7.15)	0 (-16 & 23) (-0.11±7.69)	**0.033**

Mann Whitney U test with median (min & max) and mean±standard deviation (SD), *P<0.05 was chosen as the statistical significance level

DISCUSSION

In this study, we examined the pain, anxiety, and depression scores of patients with chronic pain due to lumbar spine pathology before and after the interventional pain treatment, the impacts of pain treatment on anxiety and depression, and the impacts of pre-op anxiety and depression scores on pain treatment.

In our study, a decrease in pain levels with the interventional pain treatment administered to patients with chronic pain due to lumbar spine pathology ensured a significant reduction in depression and anxiety scores. Pain leads to emotional problems, such as anxiety and depression, in the long run.[3,16] Dariusz Kosson et al demonstrated that the most common emotional disorders in patients presenting to the algology clinic were aggression (46%), anxiety (32%), and depression (17%).[17] Lauren Rayner et al indicated a high depression rate of 60.8% in their study including 1204 patients with chronic pain who presented to a tertiary algology center.[18] Pain and depression frequently coexist, and this comorbidity places a higher burden on individuals and society compared to when they exist alone.[19] Depression is the most common mental disorder in patients with chronic pain, and its prevalence in patients with chronic pain is around 30-60%.[7,16] It has been stated that more than 50% of patients with depression report somatic complaints and at least 60% are associated with pain.[20] Whereas more pain complaints are associated with higher depression severity, an increase in pain intensity has been shown to be an indicator of poor prognosis for depression treatment.[21] The correlation between depression and chronic pain is bidirectional. While depression leads to chronic pain and decreased pain tolerance, factors such as decreased activity, helplessness, and distress that accompany chronic pain may also contribute to the development of depression.[7-9] Sarıyıldız et al applied a transforaminal epidural steroid injection under fluoroscopy to 75 patients with lumbar disc herniation, and when they re-evaluated the patients 2 weeks and 12 months after the procedure, they observed positive effects on depressive symptoms, functionality, sleep and radicular pain compared to the period before the procedure.[22]

In our study, a significant decrease was observed in anxiety scores along with pain scores after the interventional pain treatment. Pain patients with anxiety are likely to be more aware of bodily stimuli, detect physical symptoms, report more intense pain, and be less tolerant to pain, and they report more catastrophic thoughts than pain patients without anxiety.[23] Vowles et al found that the cognitive components of anxiety were indicators of pain intensity in patients with chronic low back pain.[24]

In our study, the decrease in anxiety and depression scores was also higher in the group benefiting more from pain treatment. A decrease at a similar rate in anxiety and depression with pain treatment suggests that they have a common mechanism and interact with each other. Cognitive mechanisms may play a role in the impacts of depression and anxiety on pain. The combination of pain and depression was found to be associated with a negative cognitive health bias causing the patient to focus more on pain and disability.[25] Furthermore, it was shown that depression and anxiety and pain mechanisms share common features. Accordingly, anxiety and depression were thought to be an inflammation-based physical condition that could lead to an increase in chronic pain.[26] Pain, depression and anxiety share common neurobiological networks, neurochemical compounds and cortical regions.[27,28] Common neurotransmitters such as serotonin, norepinephrine, glutamate, and GABA control both pain and mental state.[29]

It has been reported that depression and anxiety may reduce the impact of surgical outcomes by increasing pain sensation.[30,31] Studies have demonstrated that preoperative depression is associated with poor clinical outcomes in patients undergoing surgery for lumbar spinal disease, but studies on non-operative modalities are limited.[32] As an example of studies on non-surgical interventions, Lubelski et al applied conservative treatment (NSAID, membrane-stabilizing agent, physical therapy) to patients with lumbar spinal stenosis and concluded that there was significantly less improvement in depressed patients than in non-depressed patients.[33] Kim et al evaluated patients with lumbar spine disorders using the Zung Depression Scale, then administered a lumbar epidural steroid injection and examined the correlation between patients' pre-op depression and treatment outcomes. The outcome score and disability reported by the patient prior to the procedure and at the 12th month after the procedure were found to be worse in

depressed patients than in the non-depressed group, but no difference was revealed between the two groups in terms of score changes, and a similar improvement was seen between the scores.[32] Özdemir et al assessed 103 patients with lumbar disc herniation or radiculopathy using the Hospital Anxiety and Depression Scale (HADS) and Somatosensory Amplification Scale (SSAS) prior to the transforaminal epidural steroid injection. NRS and Oswestry Disability Index (ODI) values were checked in the patients prior to the procedure, at the 3rd week, and the 3rd month after the procedure. Similar to our study, patients with at least a 50% decrease in the NRS score were assigned to the successful procedure group, and patients with less than a 50% decrease were assigned to the unsuccessful procedure group. A positive correlation was determined between the pre-treatment ODI and anxiety scores, while a negative correlation was found between the percentage of decrease in the NRS scores and depression levels after the treatment. Nevertheless, the pretreatment depression, anxiety, and SSAS levels were similar between successful and unsuccessful procedures.[34] Likewise, our study found a correlation between the success of the procedure and the decrease in depression and anxiety scores but did not reveal a correlation between patients' preoperative depression and anxiety scores and the success of the interventional pain treatment.

Our study has several limitations. First, the present study ignored factors other than pain that might impact patients' depression and anxiety because our study was based on the correlation between depression, anxiety, and pain. Second, the patients' follow-up period was determined as 6 weeks after the procedure. There could have been a longer follow-up period to evaluate the patients' anxiety and depression together with the treatment outcomes.

In conclusion, relieving pain with interventional pain treatment in patients with chronic pain due to lumbar spine pathologies also reduced depression and anxiety symptoms in the patients. The depression and anxiety levels prior to the interventional treatment did not affect the success of pain treatment. The treatment of chronic pain not only enhances patients' quality of life but also positively affects their mental health.

Conflict of Interest

The authors declare that there is not any conflict of interest regarding the publication of this manuscript.

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Ethics Committee Permission

This study was approved by the Health Sciences University Samsun Training and Research Hospital Non-Interventional Clinical Research Ethics Committee (dated 09.09.2020 and numbered 2020/13/10).

Authors' Contributions

Concept/Design: TA, TSA. Data Collection and/or Processing: TA, TSA. Data analysis and interpretation: TA, TSA. Literature Search: TA, TSA. Drafting manuscript: TA, TSA. Critical revision of manuscript: TA, TSA.

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