

INCIDENCE OF ANXIETY AND DEPRESSION IN ADULT PATIENTS WITH CHRONIC DISCOGENIC BACK PAIN

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SUMMARY

Background: to analyze the results of domestic and foreign studies of the comorbidity of anxiety-depressive disorders and discogenic back pain in adult patients.

Subjects and methods: An analysis of Russian-language and foreign literature was carried out with a search depth of 5 years (2019–2024) in the following databases: PubMed, Springer, Wiley Online Library, Taylor & Francis Online, US National Library of Medicine National Institutes of Health, ScienceDirect and e-Library.

Results: Numerous studies have shown that depression and anxiety influence treatment outcomes in intervertebral disc degeneration (IVDD). Ineffective pharmacotherapy and inappropriate surgical interventions for depression and anxiety may significantly negatively affect the outcomes reported by patients with IVDD and chronic discogenic back pain. In addition, depression and anxiety have been reported to be risk factors for complications, chronic pain, and readmission after spinal surgery. Symptoms associated with mental stress, including depression and anxiety, were shown to be associated with changes in skeletal muscle tension symmetry in patients with IVDD, indicating that mental state is associated with muscle function. Therefore, it is useful for neurologists and neurosurgeons to identify anxiety and depressive disorders in patients with IVDD in order to promptly prescribe appropriate therapy for them.

Conclusion: Timely diagnosis of anxiety and depressive disorders and anxiety in patients with IVDD and chronic discogenic back pain requires an interdisciplinary approach with the participation of psychiatrists, neurologists and clinical pharmacologists, which is important for improving positive treatment outcomes and improving the quality of life of patients.

Key words: comorbidity – depression – anxiety - intervertebral disc degeneration – incidence - mutual burden syndrome

Abbreviations: ADD - anxiety-depressive disorders; ADRs - adverse drug reactions; BDI-II - Beck Depression Inventory; CBP - chronic back pain; HADS - Hospital Anxiety and Depression Scale; IVDD - intervertebral disc degeneration; MCS SF-12 - mental component score of Quality of Life Scale-Short Form 12; MDD - major depressive disorder; mJOA - modified Japanese Orthopedic Association; NDI - Neck Disability Index; ODI - Oswestry disability index; PCS - Pain Catastrophizing Scale; PCS SF-12 - physical component score of Quality of Life Scale-Short Form 12; SAS - Self-Rating Anxiety Scale; SDS - Self-Rating Depression Scale; SF-12 - Quality of Life Scale-Short Form 12; STAI - Spielberger Anxiety Inventory; VAS - visual analogue scale; WHO - World Health Organization

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INTRODUCTION

Depressive disorders are a group of mental diseases with a dominant symptom of a subjective feeling of low mood, which are one of the most common categories of mental disorders and are present in a wide range of neurological and somatic diseases: bipolar disorders; psychosomatic disorders; adaptation disorders caused by a difficult situation; poisonings and adverse drug reactions (ADRs); other mental disorders; chronic pain syndrome (DSM-V 2013).

Intervertebral disc degeneration (IVDD) is one of the most common neurological diseases that leads to the formation of chronic pain syndrome in the low back, thoracic spine and neck, radiculopathy and/or myelopathy

(Diebo et al. 2018). Chronic back pain (CBP) is a multifactorial disease and one of the most common and obvious complaints of patients with IVDD (Kazeminasab et al. 2022, Haldeman et al. 2010, Moradi-Lakeh et al. 2017). CBP is reported to be the fourth leading cause of disability and affects almost 15% of the world's population (Liu et al. 2017, GBD 2016). The total annual cost of treating neck CBP is estimated at \$686 million in the Netherlands and \$800 million in China (Liu et al. 2017, GBD 2016, Miyamoto et al. 2019). Neurosurgical treatment of IVDD is now widely accepted as the standard treatment and provides significant improvements in patient-reported outcomes (Fehlings et al. 2019). However, not all patients achieve significant improvement in CBP or reduction in

disability after surgery for IVDD. Preoperative factors such as depression and anxiety can significantly influence the results of neurosurgical procedures (Karpova et al. 2013, Tetreault et al. 2015, Trefilova et al. 2023a).

However, to date, insufficient attention has been paid to factors associated with preoperative depression and anxiety in patients with IVDD. Moreover, the negative impact of depression and anxiety on the outcome of IVDD surgery may currently be underestimated because mental health status is not routinely assessed in clinical neurological practice. Typically, demographic data and clinical characteristics of patients, such as Neck Disability Index (NDI), modified by Japanese Orthopedic Association (mJOA), Visual Analogue Scale (VAS), etc., are regularly assessed and recorded. Therefore, it is important for neurologists and neurosurgeons understand relevant factors based on the demographic and clinical characteristics of patients with IVDD to predict which patients are susceptible to depression or anxiety.

The aim of this review is analysis and systematization of the results of studies of the comorbidity of anxiety-depressive disorders and CBP in adult patients with IVDD.

SUBJECTS AND METHODS

We searched for full-text publications in Russian and English in the e-Library, PubMed, Springer, Clinical keys, Google Scholar databases, using keywords and combined word searches (depression, depressive disorders, anxiety, diagnosis, intervertebral disc degeneration, disc herniation), over the past five years. In addition, earlier publications of historical interest were included in the review. Despite our comprehensive search of these commonly used databases and search terms, it cannot be ruled out that some publications may have been missed.

RESULTS

In total, in accordance with the purpose of this review, 33 publications were found that met the search criteria. Of these, 27 studies considered anxiety and/or depressive disorders as one of the clinical components of characteristics for patients with CBP associated with IVDD. However, due to the versatility of the design of the analyzed studies, it was not possible to compare and systematize the results obtained (include statistics and describe the problems). In this regard, 5 out of 33 studies in which the incidence of anxiety and depressive disorders was one of the study endpoints were retained for further research (Table 1).

In a meta-analysis (Alvin et al. 2014) was included 346 patients who underwent cervical spine surgery for IVDD with intensive CBP and had typical symptoms and signs of IVDD and did not show improvement after at least 3 months of conservative and 3 months of surgical treatment. According to the results of this publication, of 312 patients with IVDD (182 men and 130 women, mean age 57.9 ± 9.8 years), depression was present in 32.7% of cases and anxiety in 29.5% of cases, and in 28.2% of cases – anxiety-depressive disorders (ADD). The authors noted that patients with a history of IVDD and ADD did not show improvement with conservative therapy or after surgical treatment for at least 3 months. However, a group of patients with IVDD and CBP who did not have ADD showed better results and a positive prognosis on the background of conservative therapy. The severity of depressive and anxiety disorders was assessed using the Zung Self-Rating Depression Scale (SDS) (Khan et al. 2020) and the Zung Self-Rating Anxiety Scale (SAS) (Richardson & Berven 2012). The SDS and SAS have been found to be acceptable screening tools for assessing depression and anxiety, respectively (Novitskiy et al. 2021). Patients without depression and anxiety ($n=206$, 66.0%) were defined as the control group.

Table 1. The frequency of depressive and anxiety disorders in patients with intervertebral disc degeneration

| Author, year | Sample characteristics | Damage level | Depressive disorders | Anxiety disorders | Anxiety and depressive disorders |
|---------------------------|--------------------------------|-------------------|----------------------|-------------------|----------------------------------|
| Alvin et al. (2014) | 312 patients M: 182; F: 130 | Cervical spine | 32.7% | 29.5% | 28.2% |
| Adogwa et al. (2015) | 27 patients M: 14; F: 13 | Cervical spine | 38.0% | 42.0% | 90.0% |
| Engel-Yeger et al. (2016) | 51 patients M: 24; F: 27 | Lumbosacral spine | 10.7% | 12.8% | 17.5% |
| MacDowall et al. (2017) | 151 patients M: 73; F: 78 | Cervical spine | 35.1% | 36.0% | 71.1% |
| Kao et al. (2022) | 41874 patients (M & F) | Lumbosacral spine | 1.8% | 0.2% | 2.0% |

Note: M – male; F – female

Other authors (Adogwa et al. 2015) assessed whether pre-treatment with ADD before spine surgery would improve surgical outcomes for IVDD with CBP. The authors evaluated patient-reported outcomes 1 year after anterior cervical discectomy and fusion. The study included a total of 27 adult patients with a history of ADD (study group - 11 patients, control group - 16 patients). All patients had been diagnosed with ADD by a psychiatrist at least 6 months before surgery. Inclusion criteria for the study were available demographic, surgical and clinical outcome data. Patients completed the NDI, Quality of Life Scale-Short Form 12 (SF-12), and VAS before surgery, then at 6 weeks, and 3, 6, and 12 months after surgery. Clinical outcomes and complication rates were compared between both groups of patients. The authors noted that the baseline characteristics of both cohorts were similar. At baseline, there were no significant differences between cohorts in NDI ($p=0.11$), physical component score of Quality of Life Scale-Short Form 12 (PCS SF-12) ($p=0.63$), mental component score of Quality of Life Scale-Short Form 12 (MCS SF-12) ($p=0.90$), or VAS neck CBP intensity ($p=0.80$). There were no nerve root injuries or accidental durotomies in either cohort. At 6 months postoperatively, patients in the ADD pretreated group reported significantly less postoperative back pain compared with the untreated control group ($p=0.01$). These results were maintained at 1 year ($p=0.02$). At 1 year, patients who were pretreated with ADD before surgery reported significantly lower rates of CBP compared with the control group ($p=0.02$).

Engel-Yeger et al. (2016) studied the role of neurological status compared with mental status in predicting quality of life in patients with IVDD and lumbar disc herniation. The study included 51 patients with a hernia at the conservative stage of treatment. After profiling their physical condition, all participants reported their CBP level (VAS), pain perception using the Pain Catastrophizing Scale (PCS), and Oswestry disability index (ODI). Their mental status was assessed using the Spielberger Anxiety Inventory (STAI) and the Beck Depression Inventory 2nd edition (BDI-II), and quality of life was assessed using the WHO Quality of Life Questionnaire. The authors noted that physical status/disability level was correlated with ADD. While physical status predicted the physical quality of life of patients with IVDD and CBP, mental status and mainly ADD were significant predictors of psychological, social and environmental quality of life. They noted that mental status may play a significant role in reducing most quality-of-life indicators in patients with lumbar disc herniation.

MacDowall et al. (2017) conducted a post-hoc analysis of a randomized controlled trial that compared

CBP in patients after cervical disc surgery with fusion with radiculopathy associated with IVDD. Before surgery, these patients completed a pain chart, the Hospital Anxiety and Depression Scale (HADS), and a VAS. The authors made comparisons between pain presentation and age, gender, smoking and employment status, and HADS. The study included 151 patients (mean age 47 years, women/men: 78/73). Patients with CBP according to the modified Ransford method had higher scores on HADS anxiety, HADS depression and HADS total. Patients with scars from cervical spine surgery had higher HADS depression scores. The authors noted that in patients with IVDD in the cervical spine, the severity of the condition was influenced by both the intensity of CBP and ADD. As a result, the authors concluded that the assessment of CBP may be a useful tool in interpreting the severity of symptoms in a patient with IVDD depending on the severity and characteristics of ADD, and not just the location of the pain.

Kao et al. (2022) conducted a meta-analysis of the effect of depressive disorders on low back CBP caused by IVDD. The authors analyzed a large National Health Insurance database to examine the incidence of major depressive disorder (MDD) in patients with IVDD and CBP, as well as modifying risk factors. The analysis included 41,874 patients with IVDD. Meta-analysis results showed an association between prior CBP in patients with IVDD and subsequent post-treatment MDD. Patients with IVDD and CBP had a high risk of developing MDD (odds ratio, OR: 9.00, 95% confidence interval, CI: 7.196-11.257) even after treatment. The authors noted that CBP in patients with IVDD increased due to concomitant MDD, and the effect of treatment for IVDD decreased with depression. Thus, the comorbidity of IVDD and MDD was an important public health problem associated with higher rates of disability, socioeconomic disadvantage, and increased utilization of health care resources.

DISCUSSION

Thus, our analysis included 3 studies involving patients with IVDD at the level of the cervical spine (Alvin et al. 2014, Adogwa et al. 2015, MacDowall et al. 2017) and 2 studies with IVDD at the level of the lumbosacral spine (Engel-Yeger et al. 2016, Kao et al. 2022). The total number of patients was 42,415, including 490 persons with cervical IVDD and 41,925 persons with lumbar IVDD. Overall, the incidence of depressive disorders ranged from 1.8% (Kao et al. 2022) to 38.0% (Adogwa et al. 2015). It is noteworthy that the incidence of depressive disorders in patients with cervical IVDD was statistically significantly higher and ranged from 32.7% (Alvin et al. 2014) to

38.0% (Adogwa et al. 2015) compared with patients suffering from lumbar IVDD, in which the incidence of depressive disorders varied from 1.8% (Kao et al. 2022) to 10.7% (Engel-Yeger et al. 2016). slightly lower and generally ranged from 0.2% (Kao et al. 2022) to 36.0% (MacDowall et al. 2017). However, the incidence of anxiety disorders was also higher in patients. patients with cervical IVDD from 29.5% (Alvin et al. 2014) to 42% (Adogwa et al. 2015), compared with patients with lumbar IVDD from 0.2 % (Kao et al. 2022) up to 12.8% (Engel-Yeger et al. 2016). Noteworthy is the tendency for a higher incidence of depressive disorder compared to ADD in patients with IVDD. Although the difference did not reach statistical significance for ADD, according to the study by MacDowall et al. (2017) and Adogwa et al. (2015) were the highest and accounted for 71.1% and 90% of cases, respectively. Both studies included patients with cervical IVDD. The maximum incidence of ADD in patients with lumbar IVDD was 17.5% (Engel-Yeger et al. 2016).

Diagnosis of depressive and anxiety disorders in patients with IVDD and CBP in neurological practice requires an interdisciplinary approach with the participation of neurologists, psychiatrists and clinical pharmacologists, which is important for improving the positive outcomes of conservative and surgical treatment, as well as improving the quality of life of patients (Trefilova et al. 2023b). In modern socio-economic conditions, patients suffering from depressive and anxiety disorders are among the first victims of the economic crisis. Such patients are characterized by a low level of quality of life: they quickly lose social connections, contacts with relatives, self-care skills (decrease and loss of ability to work, organize everyday life and leisure activities in everyday life). Anxiety and depressive disorders aggravate the severity of CBP in patients with IVDD, as well as the degree of social and work maladaptation of these patients.

CONCLUSIONS

Despite the development of new approaches to pharmacotherapy and surgical treatment of CBP in patients with IVDD and their implementation in real clinical practice, the problem of early diagnosis of depressive disorders and the adequacy of assessing their dynamics remains an urgent problem of modern neurology and psychiatry, but is still far from being resolved. Currently, there is no unified protocol for the use of a wide arsenal of diagnostic scales and questionnaires for CBP in patients with IVDD who have a high risk of developing anxiety and depressive disorders, which complicates continuity in the management of this category of patients at the hospital and outpatient stages of healthcare.

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Conflict of interest:

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Contribution of individual authors:

Regina Nasyrova, Maxim Novitsky & Natalia Shnayder analyzed the data with advice from Natalia Kuvshinova, Oksana Chigareva, Arseny Gayduk & Azamat Ashkhotov.

Maxim Novitsky, Natalia Shnayder & Vera Trefilova wrote the first draft of the manuscript, which has been revised by Regina Nasyrova, and upon input from the other co-authors.

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