The Problem of Emotional Well-Being and Sleep Disorders among Patients of the Neurosurgery Ward — Preliminary Research

Problem samopoczucia emocjonalnego i zaburzeń snu wśród pacjentów oddziału neurochirurgii — badania wstępne

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Abstract

Introduction. Depression and chronic pain have been among the top three leading causes of global disability in the world over the past three decades. The combination of chronic pain and depression leads to worse outcomes and overall functioning than either condition alone. Studying the links between pain, sleep and depression has become an important area of research.
Aim. Assessment of pain, emotional state and sleep disorers among patients of the neurosurgery department.
Material and Methods. The study was conducted among 63 neurosurgery patients. Standardized research tools were used: Visual Analogue Scale, Beck Depression Scale, Pittsburgh Sleep Quality Index. Statistical analysis was performed using Spearman's rho correlation test and Pearson's χ^2 test.
Results. The respondents are mostly women (54%), aged 26–78; the average age was 54. In terms of the assessment of the emotional state, patients with no depressive symptoms (42.9%) and with a mild stage of depression (46%) were noted. 77.8% of the subjects declared reduced sleep quality. Most of the subjects reported moderate (44.4%) and mild (30.2%) pain. It was shown that greater intensity of pain was statistically significantly associated with greater severity of depression ρ=0.33; p<0.01 and higher severity of sleep disorders ρ=0.39; p<0.01. It was also found that people with higher levels of depression had greater sleep disturbances ρ=0.74; p<0.001.
Conclusions. Problems with sleep and depression of varying severity characterize the majority of neurosurgical patients. Pain is one of the significant factors aggravating these disorders. **(JNNN 2023;12(1):24–33)**
Key Words: emotional state, evaluation, pain, sleep

Streszczenie

Wstęp. Depresja i przewlekły ból znalazły się w pierwszej trójce głównych przyczyn globalnej niepełnosprawności na świecie w ciągu ostatnich trzech dekad. Połączenie przewlekłego bólu i depresji prowadzi do gorszych wyników leczenia i ogólnego funkcjonowania niż każdy z tych stanów osobno. Badanie związków między bólem, snem i depresją stało się ważnym obszarem badań.
Cel. Ocena bólu, stanu emocjonalnego i zaburzeń snu wśród pacjentów oddziału neurochirurgii.

Materiał i metody. Badania przeprowadzono wśród 63 pacjentów neurochirurgii. Zastosowano standaryzowane narzędzia badawcze: Wizualna Skala Analogowa, Skala Depresji Becka, Kwestionariusz Jakości Snu Pittsburgh. Analizę statystyczną przeprowadzono testem korelacji rho Spearmana i testem χ² Pearsona.
Wyniki. Badani to w większości kobiety (54%), w wieku 26–78 lat; średnia wieku wyniosła 54 lata. W zakresie oceny stanu emocjonalnego zauważono pacjentów z brakiem objawów depresyjnych (42,9%) oraz z łagodnym stadium depresji (46%). 77,8% badanych deklarowało obniżoną jakość snu. Najwięcej badanych zgłaszało umiarkowane (44,4%) i łagodne (30,2%) dolegliwości bólowe. Wykazano, że większe nasilenie bólu powiązane było istotnie statystycznie z wyższym nasileniem depresji ρ=0,33; p<0,01 i wyższym nasileniem zaburzeń snu ρ=0,39; p<0,01. Stwierdzono również, że osoby z wyższym poziomem depresji miały większe zaburzenia snu ρ=0,74; p<0,001.
Wnioski. Problemy ze snem i depresją o różnym stopniu nasilenia charakteryzują większość pacjentów neurochirurgicznych. Ból jest jednym z istotnych czynników pogłębiających te zaburzenia. **(PNN 2023;12(1):24–33)**
Słowa kluczowe: stan emocjonalny, ocena, ból, sen

Introduction

A state of well-being is good mental health that allows individuals to cope with normal life stresses and function productively [1]. The core domains that define good mental health include: mental health knowledge, attitudes towards mental disorders, self-esteem and values, cognitive abilities, academic/occupational performance, emotions, behaviours, self-management strategies, social skills, family and important relationships, physical health, sexual health, meaning of life and quality of life [1,2]. It follows that maintaining emotional or mental well-being requires, among others, feeling of well-being, a sense of agency and awareness of one's own abilities. However, this is not synonymous with the absence of mental disorders — it rather concerns the subjective perception of oneself and one's mental state. Mood and mental well-being may be determined by persistent pain or sleep problems [3].

In its most classical definition, pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in connection with such damage; experienced by patients is a complex biopsychosocial phenomenon [4]. Pain, and especially chronic pain, is a major public health problem, with epidemiological studies indicating that approximately one-fifth of the general population suffers from it in the US and Europe [5]. Chronic pain is usually defined as any persistent or intermittent pain lasting more than 3 months, which can be divided according to various criteria, but one of the most important is the division of pain into neuropathic and nociceptive [6]. Neuropathic pain is caused by damage or disease involving the nervous system (CNS), and nociceptive pain occurs as a result of the actual one or one threatening with non-neuronal tissue damage [6,7]. In neurosurgery, a patient with pain is a patient with CNS cancer, spinal and musculoskeletal disorders, or headache; often these are chronic diseases.

Clinical studies have shown that chronic pain, as a state of stress, often causes depression, and up to 85% of patients with chronic pain suffer from severe depression [5]. In addition, the combination of chronic pain and depression leads to worse treatment outcomes and overall functioning than either condition alone [8]. This problem is highlighted by the fact that depression and chronic pain have been among the top three leading causes of global disability over the last three decades [9].

Sleep disorders are quite common. A review of several hundred epidemiological studies found that nearly a third of the general population experiences symptoms of insomnia (defined as difficulty falling asleep and/or staying asleep), 4% to 26% experience excessive sleepiness, and 2% to 4% experience obstructive sleep apnoea [3]. Studying the relationships between pain, sleep and depression in populations suffering from chronic pain is an important area of research [5]. Hence the interest in this topic, especially in the field of neurosurgery.

The aim of the study was to assess pain, emotional state and sleep disorders among patients of the neurosurgery department.

Material and Methods

The study was conducted among 63 patients of the Department of Neurosurgery and Neurology, Department of Neurosurgery, University Hospital no. 2 in Bydgoszcz, who expressed their willingness to participate in the study, were conscious, logical and maintained verbal contact.

The subjects were aged between 26 and 78, the average age was 53.92 years. A significant group consisted of people aged 56–60 (17.5%), then aged 61–65 (12.7%); people up to 40 years of age constituted 17.5% of the study group. Women constituted the majority — 54% of the study group, similarly to city dwellers (61.9%). In terms of education, people with vocational (38.2%) and secondary (34.9%) education prevailed, 7.9% had primary education. Professionally active people accounted for 42.9% of the surveyed group, 11.1% were unemployed, 46% of the surveyed were retired or on disability pensions. Professionally active people usually performed physical work (48.1%), and less often white-

collar work (37%) or mixed work (14.8%). The respondents who were married constituted 65.1% of the study group, 12.7% of the respondents were divorced. The vast majority of the respondents lived with their families (84.1%), a smaller percentage of the respondents lived alone (11.1%) (Table 1).

Table 1. Characteristics of the study group (N=63)

Variable	N	%
Gender		
Women	34	53.97
Men	29	46.03
Age		
26–35 years	8	12.69
36–45 years	9	14.28
46–55 years	14	22.22
56–65 years	19	30.15
Over 65 years	13	20.63
Place of residence		
Village	24	38.1
City	39	61.9
Education		
Primary	5	7.93
Vocational	24	38.1
Secondary	22	34.92
Higher	12	19.04
Marital status		
Single	11	17.46
Married	41	65.08
Divorced	8	12.7
Widow/Widower	3	4.77
Occupational status		
Unemployed	7	11.11
Retired/pensioner	29	46.03
Retired/pensioner and works professionally	1	1.58
Works professionally	26	41.27
Type of work		
Physical	17	26.98
Physical mental	3	4.77
Mental	13	20.63
Not applicable	30	47.62

N — number of observations; % — percent

The clinical diagnosis of the subjects was determined taking into account the ICD — 10 classification. In the study group, people with diseases of the musculoskeletal system and connective tissue prevailed (49.2%), followed by people with diseases of the nervous system (14.3%) and cardiovascular diseases (12.7%). A smaller percentage were people with tumours in situ (7.9%) or injuries involving multiple body areas (6.3%). Surgical procedures were declared by 25.4% of the respondents, 33.4% of the respondents had one surgery in the past. There were no chronic diseases in 28.6% of the group, 27% of the respondents did not have one chronic disease, and 20.6% did not have two diseases (Table 1).

The study used the diagnostic survey method, using standardized research tools:

- Visual Analogue Scale (VAS) — a tool for subjective assessment of pain intensity [10]. The results were interpreted as [11]: 0–no pain (group I), 1–3 means mild pain (group II), 4–7 means moderate pain (group III), 8–10 indicates severe pain (group IV).
- Beck Depression Inventory (BDI) [12] — used to assess the emotional state. It is a point scale, each point contains a question and answers based on the most frequently described symptoms and attitudes occurring in depressive patients, from which he chooses one. The sum of points allows for the following assessment: 0–11 points — without depression (group I), 12–26 points — mild depression (group II), 27–49 points — moderately severe depression (group III), 50–63 points — very severe depression (group IV) [12].
- Pittsburgh Sleep Quality Index (PSQI) — [13] was developed to quantify sleep quality, but has also been used as convergence in most studies, suggesting that the PSQI can be considered an accepted benchmark or gold standard for self-perceived sleep quality. In addition, it is the most widely used sleep quality assessment tool in both clinical and non-clinical populations [14]. Each answer in the questionnaire is assigned points — from 0 to 3 — their sum in the range from 0 to 21 determines the quality of sleep, where the higher the score, the worse it is. The sum exceeding 5 points indicates a decrease in sleep quality [13,14].

In addition, a questionnaire was formulated to collect sociodemographic and clinical data.

The collected material was statistically processed using Spearman's rho correlation analysis and Pearson's χ^2 test. A value of $p<0.05$ was considered statistically significant.

The condition for the implementation of the research was obtaining a positive opinion of the Bioethical Committee at the Collegium Medicum in Bydgoszcz regarding the concept of the presented work (KB 503/2022) and obtaining the consent of the Hospital Director to conduct the research (no. 62/2022).

Results

Assessment of Pain, Emotional State and Sleep Quality

The examined patients assessed the intensity of pain according to the VAS scale between 0 and 10 points, the average was 4.60 points with a standard deviation of ±2.68 points. Most people rated the severity of pain at 5 points (19%), at 2 points (17.5%) or at 8 points (14.4%). No pain was found in 6.3% of the subjects, mild pain in 30.2% of the subjects, moderate pain in 44,4% of the subjects, and severe pain in 19% of the subjects (Table 2).

The Beck Depression Questionnaire was used to assess the emotional state. In this scale, the subjects scored between 0 and 41 points, and the average level of depression was 14.0 points with a standard deviation of±9.92 points. The absence of depression was demonstrated in 42.9% of the examined patients, 46%

of the examined patients showed a mild depression, and in 11.1% a moderately severe depression in the Beck's scale. None of the patients was qualified to group IV (Table 2).

The PSQI questionnaire was used to assess the sleep disorders of the respondents. In this scale, the subjects scored between 2 and 18 points, where the average was 9.03 points with a standard deviation of ±4.16 points. 22.2% of the subjects had normal sleep quality, and 77.8% of the subjects had reduced sleep quality (Table 2).

In order to examine the relationship between the intensity of pain, the level of depression and the quality of sleep, Spearman's rho correlation analysis was performed. It was shown that greater intensity of pain was statistically significantly associated with greater severity of depression $\rho=0.33$; $p<0.01$ and higher severity of sleep disorders $\rho=0.39$; $p<0.01$. It was also found that people with higher levels of depression had greater sleep disturbances $\rho=0.74$; $p<0.001$ (Table 2).

Table 2. Assessment of pain, emotional state and sleep quality of the subjects

Scale	Categories	N	%	VAS		BECK		PSQI	
				rho	p	rho	p	rho	p
VAS	No pain	4	6.35						
	Mild pain	19	30.16	1	0.000	–	–	–	–
	Moderate pain	28	44.44						
	Severe pain	12	19.05						
BECK	No depression	27	42.86						
	Mild depression	29	46.03	0.330	0.007	1	0.000	–	–
	Moderately severe depression	7	11.11						
	Very severe depression	0	0.00						
PSQI	Decreased sleep quality	49	77.78	0.390	0.002	0.740	0.000	1	0.000
	Normal sleep quality	14	22.22						

N — number of observations; % — percent; rho — Spearman's rho statistics; p — level of statistical significance

Relationship between Sociodemographic and Clinical Variables and Pain, Emotional State and Sleep Quality

First, the variables characterizing the respondents (sociodemographic and clinical) were analysed in terms of pain (Table 3). These results turned out to be statistically insignificant $p>0.05$. Age, gender, place of residence, education, professional situation or marital status did not influence the pain level of the respondents. On the other hand, the severity of pain was statistically significantly associated with the diagnosis $\chi^2=15.36$; $p<0.01$, but not related to previous operations $\chi^2=8.42$; $p=0.209$ and comorbidities $\chi^2=3.58$; $p=0.733$. Patients with musculoskeletal system and connective tissue

diseases experienced higher intensity of pain than those with other diagnosis (Table 3).

Then, the emotional state was analysed in the discussed scope (Table 4). On the basis of the obtained results of analyses using Pearson's χ^2 tests, it can be concluded that there was a relationship between the Beck scale and gender $\chi^2=4.99$; $p=0.082$ and professional situation $\chi^2=5.21$; $p=0.074$. Moderately severe depression tended to occur in women and in the professionally inactive people. No more statistically significant associations were shown; $p > 0.05$ (Table 4).

The relationship between sleep quality (PSQI scale) and sociodemographic and clinical variables was also investigated using a series of analyses using Pearson's χ^2 tests (Table 5). In relation to the former, the results

Table 3. Relationship between pain and variables characterizing the subjects

Study group characteristics	VAS scale (%)				χ²	p
	I	II	III	IV		
Age						
Up to 50 years	8.3	20.8	45.8	25.0	2.10	0.553
Over 50 years	5.1	35.9	43.6	15.4		
Gender						
Women	8.8	35.3	44.1	11.8	3.42	0.332
Men	3.4	24.1	44.8	27.6		
Place of residence						
City	8.3	25.0	50.0	16.7	0.97	0.809
Village	5.1	33.3	41.0	20.5		
Education						
Primary/vocational	3.4	31.0	51.7	13.8		
Secondary	4.5	31.8	31.8	31.8	6.89	0.331
Higher	16.7	25.0	50.0	8.3		
Professional situation						
Works professionally	11.1	37.0	33.3	18.5	3.75	0.290
Unemployed/pensioner/retired	2.8	25.0	52.8	19.4		
Type of work						
Physical	11.8	41.2	23.5	23.5	2.18	0.537
Mental	10.0	30.0	50.0	10.0		
Marital status						
In a relationship	4.9	29.3	48.8	17.1	1.17	0.761
Other	9.1	31.8	36.4	22.7		
Residence status						
With family	7.5	28.3	49.1	15.1	5.47	0.140
Other	0.0	40.0	20.0	40.0		
Diagnosis						
Musculoskeletal and connective tissue disease	3.2	9.7	64.5	22.6	15.36	0.002
Other	9.4	50.0	25.0	15.6		
Past surgeries						
None	6.3	25.0	68.7	0.0		
1–2 surgeries	5.9	29.4	35.3	29.4	8.42	0.209
More	7.6	38.5	38.5	15.4		
Chronic diseases						
None	5.6	38.9	33.3	22.2		
1–2 diseases	6.7	26.7	43.3	23.3	3.58	0.733
More	6.7	26.6	60.0	6.7		

% — percent; χ² — Chi-square statistic; p — level of statistical significance

turned out to be statistically insignificant p>0.05. In the case of the latter, it was shown that the quality of sleep on the border of the statistical tendency was found only in correlation with the diagnosis χ²=3.07; p=0.080. No such associations were observed with regard to operations (χ²=0.82; p=0.664) and comorbidities (χ²=1.03; p=0.598). This means that reduced sleep quality was more common in people with musculoskeletal and connective tissue diseases than in people with a different diagnosis (Table 5).

Table 4. Relationship between the emotional state and the variables characterizing the respondents

Study group characteristics	BECK scale (%)				χ²	p
	I	II	III	IV		
Age						
Up to 50 years	41.7	50.0	8.3	0.0	0.42	0.813
Over 50 years	43.6	43.6	12.8	0.0		
Gender						
Women	32.4	50.0	17.6	0.0	4.99	0.082
Men	55.2	41.4	3.4	0.0		
Place of residence						
City	37.5	50.0	12.5	0.0	0.46	0.795
Village	46.2	43.5	10.3	0.0		
Education						
Primary/vocational	37.9	55.2	6.9	0.0		
Secondary	40.9	50.0	9.1	0.0	6.33	0.176
Higher	58.3	16.7	25.0	0.0		
Professional situation						
Works professionally	59.3	33.3	7.4	0.0	5.21	0.074
Unemployed/pensioner/retired	30.6	55.5	13.9	0.0		
Type of work						
Physical	47.1	47.1	5.8	0.0	3.89	0.143
Mental	80.0	10.0	10.0	0.0		
Marital status						
In a relationship	39.0	51.2	9.8	0.0	1.28	0.527
Other	50.0	36.4	13.6	0.0		
Residence status						
With family	39.7	50.9	9.4	0.0	3.41	0.182
Other	60.0	20.0	20.0	0.0		
Diagnosis						
Musculoskeletal and connective tissue disease	41.9	45.2	12.9	0.0	0.20	0.905
Other	43.8	46.8	9.4	0.0		
Past surgeries						
None	56.3	37.4	6.3	0.0		
1–2 surgeries	38.2	50.0	11.8	0.0	1.83	0.766
More	38.5	46.1	15.4	0.0		
Chronic diseases						
None	55.6	38.8	5.6	0.0		
1–2 diseases	40.0	46.7	13.3	0.0	2.13	0.712
More	33.3	53.4	13.3	0.0		

% — percent; χ² — Chi-square statistic; p — level of statistical significance

Table 5. Relationship between sleep quality and variables characterizing the subjects

Study group characteristics	PSQI scale (%)		χ^2	p
	Normal sleep quality	Decreased sleep quality		
Age				
Up to 50 years	12.5	87.5	2.12	0.145
Over 50 years	28.2	71.8		
Gender				
Women	23.5	76.5	0.07	0.787
Men	20.7	79.3		
Place of residence				
City	16.7	83.3	0.69	0.405
Village	25.6	74.4		
Education				
Primary/vocational	20.7	79.3		
Secondary	22.7	77.3	0.10	0.953
Higher	25.0	75.0		
Professional situation				
Works professionally	22.2	77.8	0.00	1.000
Unemployed/pensioner/retired	22.2	77.8		
Type of work				
Physical	23.5	76.5	0.05	0.831
Mental	20.0	80.0		
Marital status				
In a relationship	19.5	80.5	0.50	0.480
Other	27.3	72.7		
Residence status				
With family	24.5	75.5	1.03	0.311
Other	10.0	90.0		
Diagnosis				
Musculoskeletal and connective tissue disease	12.9	87.1	3.07	0.080
Other	31.3	68.8		
Past surgeries				
None	18.8	81.3		
1–2 surgeries	26.5	73.5	0.82	0.664
More	15.4	84.6		
Chronic diseases				
None	27.8	72.2		
1–2 diseases	16.7	83.3	1.03	0.598
More	26.7	73.3		

% — percent; χ^2 — Chi-square statistic; p — level of statistical significance

Discussion

This study was aimed at evaluating pain, emotional state and sleep disorders among patients of the neurosurgery department. In the available literature, there are inconsistencies related to the association of chronic pain with depression and sleep quality, which may be due to methodological problems [15]. Some studies assess pain intensity using a variety of scales, such as the McGill pain questionnaire [16], the brief pain inventory [17], a visual analogue scale [18] or only one question as to whether the patient has chronic pain [19]. These measurements most often assess current pain or pain over the last week and have an insufficient comprehensive and multidimensional viewpoint related to chronic pain that lasts more than three months [15]. Our study used the VAS scale and asked about pain ratings over the last month; the average pain was 4.60 points with a standard deviation of ±2.68 points. Considering that the majority of the respondents were patients with diseases of the musculoskeletal system, where pain is the main symptom, this is not a surprising result.

Due to the epidemic of chronic back pain and the introduction of minimally invasive surgical techniques, a rapid increase in the number of cases is observed [20]. Osteoarthritis and disc herniation surgeries are common in the younger population, while patients over 60 years of age are most likely to undergo spinal stenosis surgery [21]. Pain assessment from the beginning of hospitalization is a basic aspect of therapeutic activities in neurosurgery. Research shows that the lack of verification of pain is associated with delayed wound healing, prolonged hospital stay, morbidity and higher costs, while preoperative use of painkillers has a positive effect on early convalescence [21].

The literature shows that the female population is more affected by pain disorders, and the perception of pain increases with age [22]. Our research did not show that age, gender, place of residence, education, professional situation or marital status had any influence on the level of pain of the respondents.

It is emphasized that musculoskeletal pain is often influenced by lifestyle and work activities, as some risk factors predispose to pain either because of the direct effect they have on the musculoskeletal system or because they influence lifestyle by promoting the onset of pain [23,24]. Smoking and a diet high in protein and animal fats are factors that exacerbate chronic pain associated with musculoskeletal disorders by stimulating immune cells to release inflammatory mediators, but also a sedentary lifestyle, correlated with reduced muscle mass and strength, increased risk of fractures and obesity [22]. Depression is one of these factors.

In own research, emotional state disorders were found in 42.9% of the examined patients, 46% of the examined patients showed a mild depression, and 11.1% a moderately severe depression in the Beck's scale. Pain is not only a sensory experience, but also an emotional one that can have very different effects on people; according to some data, from 30 to 60% of people with chronic pain also suffer from depression [22]. In addition, a bidirectional relationship between depression and chronic pain has been reported, as pain is a strong predictor of depression severity and vice versa [25]. Currently, it is not fully known whether pain causes the symptoms of emotional state disorders or whether depression exacerbates pain [26].

Some reports indicate that women are more prone to depression (5.1%) than men (3.6%) due to certain biological, psychosocial and environmental factors [27]. In these studies, moderately severe depression was usually found in women and in the professionally inactive people. Baskan et al. [28] observed greater musculoskeletal pain and moderate to severe levels of depression in unemployed women than in employed women who showed mild levels of depression, possibly due to their concentration at work and economic independence.

Sleep problems are a significant ailment among people suffering from chronic pain, with estimated prevalence rates as high as 88% [29]. These problems have been observed in various pain groups, including musculoskeletal disorders, fibromyalgia, chronic headaches and neuropathic pain [30]. In addition, the literature examining the relationship between pain and sleep problems shows a bidirectional relationship, with evidence suggesting that pain is a predictor of sleep disorders, while poor sleep quality exacerbates the effects of pain, especially in people with chronic pain [29,31]. In our research, sleep disorders occurred in about 80% of respondents, mainly in people with musculoskeletal disorders. It was also shown that greater intensity of pain was statistically significantly associated with greater severity of depression and higher severity of sleep disorders; it was also found that those with higher levels of depression had greater sleep disturbances. The results of Zambelli et al. [29] also indicate that sleep quality moderates the relationship between pain interference and depression, so that better sleep quality buffers the effect of pain interference on depression, and equally poorer quality of sleep increases the effect of pain interference on depression in this group. Similarly, Alhalal et al. [32] indicated that patients with severe pain disability show worse symptoms of depression and poor sleep quality.

Conclusions

1. The observed indicators of pain, emotional state disturbances and sleep problems prove the large scale of these abnormalities among neurosurgical patients.
2. Greater intensity of pain was statistically significantly associated with higher intensity of depression and higher intensity of sleep disorders. It was also found that those with higher levels of depression had greater sleep disturbances.

Implications for Nursing Practice

The problem of pain, depression and sleep disorders is becoming more and more common in the population, which indicates the ineffectiveness of the actions taken in this area and the resulting need to develop algorithms of conduct, and especially to assess these disorders by nurses during the hospitalization of patients.

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