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Chronic pain coping styles in patients with herniated lumbar discs and coexisting spondylotic changes treated surgically: Considering clinical pain characteristics, degenerative changes, disability, mood disturbances, and beliefs about pain control

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Background: Pain catastrophizing, appraisals of pain control, styles of coping, and social support have been suggested to affect functioning in patients with low back pain. We investigated the relation of chronic pain coping strategies to psychological variables and clinical data, in patients treated surgically due to lumbar disc herniation and coexisting spondylotic changes.





Material/Methods: The average age of study participants (n=90) was 43.47 years (SD 10.21). Patients completed the Polish versions of the Chronic Pain Coping Inventory-42 (PL-CPCI-42), Beck Depression Inventory (BDI-PL), Coping Strategies Questionnaire (CSQ-PL), Beliefs about Pain Control Questionnaire (BPCQ-PL), and Roland-Morris Disability Questionnaire (RMQ-PL).

Results: In the PL-CPCI-42 results, resting, guarding and coping self-statements were frequently used as coping strategies (3.96 SD 1.97; 3.72 SD 1.72; 3.47 SD 2.02, respectively). In the CSQ-PL domains, catastrophizing and praying/hoping were frequently used as coping strategies (3.62 SD 1.19). The mean score obtained from the BDI-PL was 11.86 SD 7.23, and 12.70 SD 5.49 from the RMDQ-PL. BPCQ-PL results indicate that the highest score was in the subscale measuring beliefs that powerful others can control pain (4.36 SD 0.97). Exercise correlated significantly with beliefs about internal control of pain (rs=0.22). We identified associations between radiating pain and guarding (p=0.038) and between sports recreation and guarding (p=0.013) and task persistence (p=0.041).

Conclusions: Back pain characteristics, depressive mood, disability, and beliefs about personal control of pain are related to chronic LBP coping styles. Most of the variables related to advancement of degenerative changes were not associated with coping efforts.

Key words: **disc herniation • chronic pain coping styles • CPCI-42 • beliefs about pain control**

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Background

Coping refers to the strategies used to deal with the negative impact of stress [1]. The relationships between pain intensity and psychosocial variables, like pain coping strategies, have been extensively examined [2,3]. Jensen et al. noted that most of the research analyzed failed to find significant correlations between pain severity and coping strategies, as measured by the Coping Strategy Questionnaire (CSQ) subscales: ignoring pain and coping self-statements [4].

Styles of coping and perceived social support are related to different profiles of psychosocial functioning of patients with low back pain (LBP). It is often emphasized that the effects of LBP are not limited to motor dysfunctions, since back pain is also related to negative impact on patients' social relationships, self-esteem, and life satisfaction or with psychological disturbances such as depression, anxiety, and somatoform disorders [5–10].

Among psychological variables, pain catastrophizing, appraisals of pain control, personality, styles of coping, and social support have been suggested to affect psychosocial functioning in patients with LBP [11]. Carroll et al. [12] found that disabling non-specific neck and back pain was highly associated with passive coping regardless of active coping. Lower education was associated with the combination of low levels of active coping and high levels of passive coping.

Assessing psychosocial factors for patients with spinal pain is especially important. To screen for psychosocial risk factors of chronic low back pain (CLBP), an appropriate measurement instrument is essential [13,14]. The Chronic Pain Coping Inventory-42 (CPCI-42) is used to assess behavioral and cognitive coping strategies used to cope with pain during the last week [15]. Because chronic pain syndrome is strongly associated with behavioral adjustment, we believe it is important to include an assessment of behavioral coping strategies in patients with CLBP [15]. Therefore, the aim of the present study was to investigate the relation of chronic pain coping strategies to psychological variables and socio-demographic and clinical data in patients treated surgically due to lumbar disc herniation and coexisting spondylotic changes.

Material and Methods

Measures

To assess chronic pain coping styles, all patients completed the Polish version of CPCI-42 (PL-CPCI-42). Subjects were also asked to complete the Polish versions of the following self-administered questionnaires: Beck Depression Inventory (BDI-PL), Coping Strategies Questionnaire, Beliefs about Pain Control

Questionnaire (BPCQ-PL), and Roland-Morris Low Back Pain Disability Questionnaire (RMQ-PL) [16–18].

The CPCI-42, a 42-item abbreviated version, assesses cognitive and behavioral strategies for coping with chronic pain. This version has several advantages, including facilitation and acceptability, and its use can reduce the test burden in clinical or research settings. A previous study has already shown that the CPCI-42 is reliable and valid. The Likert-style response scale included 8 levels (0–7) measuring the frequency with which the participants used 42 coping strategies and the number of days on which they used each of these at least once to cope with pain during the past week [15]. These 42 items are grouped into the following 8 subscales: guarding, resting, asking for assistance, relaxation, task persistence, exercise/stretch, coping self-statements, and seeking social support. The initial validation process of the CPCI revealed high internal consistency among its 64 items [15]. The study concerning the validation process of the Polish version of CPCI-42 is summarized in our other manuscript.

The CSQ consists of 50 questions that evaluate 6 cognitive strategies (diverting attention, reinterpreting pain sensations, ignoring pain sensations, coping self-statements, catastrophizing, and praying/hoping) and 1 behavioral strategy (increasing behavioral activities) for coping with pain. Each subscale has 6 items, and each item is rated from 0 (never do that) to 6 (always do that). Each subscale score can range from 0 to 36. In addition, the 2 effectiveness items are used to rate the overall ability to control pain and to decrease pain. These items are rated on a 7-point scale that ranges from 0 (no control/not able to decrease pain at all) to 6 (complete control/able to decrease pain completely) [17].

The BPCQ is a 13-item questionnaire that measures beliefs about internal or personal control of pain (IS), beliefs that powerful others (doctors) can control pain (PD), and beliefs that pain is controlled by chance events (CH) [19,20]. Higher scores in the subscales indicated stronger endorsements of the respective beliefs. Normative data do not exist for the BPCQ, but previous scores of patients and non-patients are available in the literature for comparative purposes [19,20].

The BDI, a 21-item self-report rating inventory that measures symptoms and characteristic attitudes of depression in the previous 2 weeks, was developed and revised by Beck et al. [21,22]. It is written at a fifth- or sixth-grade reading level and requires minimal time and no special training to administer. The BDI has been used extensively in clinical diagnosis and research [21,22]. The severity of each individual item is scored from 0 to 3; 0–10 points is considered as normal mood, 11–16 points as mild mood disturbance, 17–20 points as borderline clinical depression, 21–30 points as moderate depression, 31–40 points as severe depression, and scores of over 40 points are considered as extreme depression [21,22].

To assess CLBP-related disability, we used the RMDQ-PL [18], which assesses perceived limitations in 24 activities of daily life dichotomously. The sum score is calculated by totalling the 'yes' answers. The scale ranges from 0 (no disability) to 24 (severe disability).

Study design

The study was carried out between January and June 2011. Ninety patients hospitalized during this period at the neurological ward due to CLBP were approached and asked to take part in the study. The patients were recruited consecutively. All participants were in the care of 1 consultant neurosurgeon.

All patients were adults (over 18 years of age) and had a confirmed medical diagnosis of CLBP. After complete description of the study, written informed consent was obtained from all the participants. Participants were assured of anonymity and that a refusal to participate in the study would not affect further treatment. The design of the study was approved by the Bioethics Committee of Poznan University of Medical Sciences.

After enrollment, patients were asked to complete the questionnaires before surgical treatment. The socio-demographic and clinical data such as age, gender, educational level, marital status, employment status, and back pain characteristics were collected. Medical records were reviewed for disease and treatment information (cancer diagnosis and number of comorbidities). Comorbidities such as glaucoma, diabetes, asthma, gastritis, rheumatoid arthritis, hepatitis B, hypertension, cardiac arrhythmia, and coronary disease were recorded.

Sample characteristics

Inclusion criteria were the following: age 18–65 years, chronic low back pain of more than 12 weeks duration according to Sheer et al. [23] with or without leg pain, and no previous spinal surgery. The causes of CLBP included herniated lumbar discs and coexisting spondylotic changes. All patients were treated operatively. Standard discectomy was performed in all study participants. Patients were not eligible if they had spinal trauma, tumor, spondylitis, previous spinal surgery, or if they were unable to communicate in Polish. We also excluded patients with addiction to drugs or alcohol.

All patients underwent a magnetic resonance scan and lumbosacral spine X-rays in anteroposterior and lateral projections, considering the following changes: facet hypertrophy, hypertrophy ligamentum flavum, osteophytes of vertebral bodies, and narrowing of the neural foramen. The evaluation of degenerative changes and signal intensity changes in vertebral body marrow adjacent to the endplates of degenerative

discs in the lumbar region was carried out according to the Modic scale [24].

Males constituted 60% of the analyzed group (54 participants). The average age was 43.47 years (SD 10.21), range 26–64 years. The average duration of pain in the lumbosacral spinal region was 49.37 months (SD 64.71), range 3–300 months. Table 1 summarizes the socio-demographic and clinical characteristics of the study participants.

Statistical analysis

In respect to statistical quantitative features, we determined means, minimal and maximal values, standard deviations, and 95% confidence intervals. In the quality field, we supplied the number of units for specific categories of a given characteristic and their relative percentage values.

Statistical analysis was carried out using the Statistica program. The Spearman's rank correlation coefficient (r_s) was used to determine dependency between quantitative characteristics. The Mann-Whitney test or the Kruskal-Wallis test was applied to determine dependency between quantitative and qualitative characteristics. The borderline value of statistical significance was set at $p=0.05$. Test results with a greater value than this were deemed to be statistically irrelevant.

Results

Descriptive statistics

Table 2 presents descriptive statistics of 8 dimensions of the PL-CPCI-42. Interestingly, we found that resting, guarding, and coping self-statements were frequently used as coping strategies (3.96 SD 1.97, 3.72 SD 1.72, and 3.47 SD 2.02, respectively), in contrast to relaxation and exercise/stretch (1.79 SD 1.32 and 1.89 SD 1.63, respectively).

Table 3 presents results of the remaining outcome measures: BDI-PL, CSQ-PL, BPCQ-PL, and RMQ-PL. Taking into account the results in the CSQ-PL domains, catastrophizing and praying/hoping were frequently used as coping strategies, in contrast to the rarely used reinterpreting pain sensations domain (3.62 SD 1.19, 3.07 SD 1.28, and 1.39 SD 1.29, respectively). The mean score obtained from the BDI-PL was 11.86 SD 7.23, which is interpreted as mild mood disturbance. BPCQ-PL results indicate that the highest score was in the subscale measuring beliefs that powerful others (doctors) can control pain (4.36 SD 0.97), followed by beliefs that pain is controlled by chance events (3.42 SD 0.98). The lowest score was in the subscale measuring beliefs about internal or personal control of pain (3.26 SD 0.94). The mean score of the RMDQ-PL was 12.70 SD 5.49 out of 24 possible points.

Table 1. Characteristics of study participants.

Characteristics	Mean (SD), range	No. (%)
Gender (M/F)	–	54(60)/36(40)
Age (years)	43.47 (10.21), 26–64	–
CLBP duration (months)	43.37 (64.71), 3–300	–
Spine overload	–	47 (52.22)
Symptoms		
Lumbalgia	–	23 (25.56)
Ischialgia	–	67 (74.45)
Motor and sensory abnormalities	–	23 (25.56)
Recreational sport activity before beginning of the disease	–	24 (26.67)
Smoking	–	36 (40.00)
Earlier physical therapy	–	62 (68.89)
Continuous use of opioid	–	10 (11.11)
No. of comorbidities		
None	–	70 (77.78)
One	–	13 (14.44)
Two	–	5 (5.56)
Three	–	2 (2.22)
Number of discopathy levels	–	
1 level	–	51 (56.67)
2 or more levels	–	39 (43.33)
Modic classification	–	
Type 1	–	24 (26.67)
Type 2	–	35 (38.89)
Type 3	–	31 (34.44)
Other degenerative changes	–	
Facet hypertrophy	–	35 (38.89)
Hypertrophy ligamentum flavum	–	18 (20.00)
Osteophytes of vertebral bodies	–	38 (42.22)
Narrowing of the neural foramen	–	19 (21.11)

CLBP – chronic low back pain.

Analyses by quality of life data

Tables 4 and 5 list correlations between the PL-CPCI-42 and the BDI-PL, BPCQ-PL, RMQ-PL, and CSQ-PL. Especially important, all subscales of PL-CPCI-42 were significantly correlated

with RMQ-PL except for task persistence and exercise/stretch. The correlation coefficients were guarding ($rs=0.49$), resting ($rs=0.43$), asking for assistance ($rs=0.43$), relaxation ($rs=0.38$), coping self-statements ($rs=0.33$), and seeking social support ($rs=0.26$).

Table 2. Descriptive statistics of the PL-CPCI-42 subscales.

PL-CPCI-42 subscales	Test			
	Mean	Range	95% confidence intervals	SD
Guarding	3.72	0–7	3.36–4.08	1.72
Resting	3.96	0–7	3.54–4.37	1.97
Asking for assistance	2.85	0–7	2.40–3.30	2.15
Relaxation	1.79	0–5.6	1.51–2.06	1.32
Task persistence	3.19	0–7	2.84–3.54	1.68
Exercise / stretch	1.89	0–7	1.54–2.23	1.63
Coping self-statements	3.47	0–7	3.05–3.90	2.02
Seeking social support	3.24	0–7	2.82–3.67	2.04

PL-CPCI-42 – Polish language version of the Chronic Pain Coping Inventory-42.

Table 3. Descriptive statistics of CSQ-PL, BDI-PL, BPCQ-PL and RMQ-PL.

Measurements	Mean	Range	95% confidence intervals	SD
CSQ-PL subscales				
Diverting attention	2.37	0–5.33	2.12–2.62	1.19
Reinterpreting pain sensations	1.39	0–4.33	1.12–1.66	1.29
Ignoring pain sensations	2.22	0–5.67	1.92–2.51	1.40
Coping self-statements	2.03	0–5.50	1.76–2.30	1.31
Catastrophizing	3.62	0–6.00	3.31–3.94	1.49
Praying/hoping	3.07	0.33–5.50	2.80–3.33	1.28
Behavioral activities	2.67	0–4.67	2.42–2.91	1.17
Item 43	3.26	0–6.00	2.87–3.38	1.23
Item 44	4.36	0–6.00	2.58–3.04	1.09
BDI-PL	11.86	1–33.00	10.34–13.37	7.23
BPCQ-PL subscales				
Internal or personal control of pain (IS)	3.26	1.2–6.00	3.06–3.46	0.94
Pain controlled by powerful others (PD)	4.36	1–6.00	4.16–4.56	0.97
Pain controlled by chance events (CH)	3.42	1–5.75	3.22–3.63	0.98
RMQ-PL	12.70	2–24.00	11.55–13.85	5.49

CSQ-PL – Coping Strategies Questionnaire, BDI-PL-Beck – Depression Inventory; BPCQ-PL-Beliefs – about Pain Control Questionnaire; RMQ-PL-Rolland-Morris – Low Back Pain Disability Questionnaire.

In addition, the BDI-PL was positively correlated with domains of asking for assistance, relaxation, and seeking social support ($r_s=0.27$, $r_s=0.27$, and $r_s=0.23$, respectively)

We also assessed the relation between chronic pain coping strategies and beliefs about pain control; however, this analysis revealed that only one PL-CPCI-42 subscale (exercise/

Table 4. Correlations between the PL-CPCI-42 domains and the BDI-PL, BPCQ-PL and RMQ-PL.

PL-CPCI-42 subscales	BDI-PL	BPCQ-PL subscales			RMQ-PL
		IS	PD	CH	
Guarding	rs=0.19 p=0.080	rs=0.09 p=0.389	rs=0.10 p=0.325	rs=0.05 p=0.636	rs=0.49 p<0.001*
Resting	rs=0.10 p=0.329	rs=-0.02 p=0.861	rs=0.04 p=0.703	rs=0.10 p=0.325	rs=0.53 p<0.001*
Asking for assistance	rs=0.27 p=0.010*	rs=0.06 p=0.544	rs=0.06 p=0.548	rs=0.14 p=0.168	rs=0.43 p<0.001*
Relaxation	rs=0.27 p=0.010*	rs=0.13 p=0.214	rs=0.13 p=0.22	rs=0.15 p=0.150	rs=0.38 p<0.001*
Task persistence	rs=0.03 p=0.793	rs=0.10 p=0.352	rs=-0.09 p=0.379	rs=0.02 p=0.830	rs=-0.01 p=0.997
Exercise/stretch	rs=-0.01 p=0.890	rs=0.22 p=0.038*	rs=-0.02 p=0.866	rs=-0.06 p=0.590	rs=0.01 p=0.960
Coping self-statements	rs=0.15 p=0.146	rs=0.02 p=0.870	rs=0.15 p=0.171	rs=0.08 p=0.440	rs=0.33 p=0.001*
Seeking social support	rs=0.23 p=0.030*	rs=0.14 p=0.204	rs=0.15 p=0.147	rs=0.13 p=0.209	rs=0.26 p=0.012*

PL-CPCI-42 – Polish language version of the Chronic Pain Coping Inventory-42; BDI-PL-Beck – Depression Inventory; BPCQ-PL-Beliefs – about Pain Control Questionnaire; IS – internal or personal control of pain; PD – pain controlled by powerful others; CH – pain controlled by chance events; RMQ-PL-Rolland-Morris – Low Back Pain Disability Questionnaire; * p<0.05.

Table 5. Correlation between PL-CPCI-42 subscales and CSQ-PL results.

PL-CPCI-42 subscales	CSQ-PL subscales								
	Diverting attention	Reinterpret-ing pain sensations	Ignoring pain sensations	Coping self-statements	Catastro-phizing	Praying/hoping	Behavioral activities	Item 43	Item 44
Guarding	rs=0.14 p=0.202	rs=0.12 p=0.258	rs=0.11 p=0.292	rs=0.06 p=0.548	rs=0.14 p=0.189	rs=0.15 p=0.148	rs=0.06 p=0.592	rs=-0.05 p=0.631	rs=-0.03 p=0.766
Resting	rs=0.17 p=0.115	rs=0.12 p=0.270	rs=0.14 p=0.200	rs=-0.03 p=0.806	rs=0.16 p=0.130	rs=0.06 p=0.583	rs=0.06 p=0.597	rs=-0.11 p=0.323	rs=-0.15 p=0.162
Asking for assistance	rs=0.12 p=0.250	rs=0.07 p=0.543	rs=0.33 p=0.002*	rs=-0.11 p=0.299	rs=0.21 p=0.046*	rs=0.11 p=0.300	rs=-0.06 p=0.561	rs=-0.21 p=0.042*	rs=-0.21 p=0.052
Relaxation	rs=0.37 p<0.001*	rs=0.31 p=0.002*	rs=0.23 p=0.015*	rs=0.41 p<0.001*	rs=0.30 p=0.004*	rs=0.18 p=0.094	rs=0.27 p=0.010*	rs=-0.04 p=0.680	rs=0.06 p=0.574
Task persistence	rs=0.09 p=0.413	rs=0.14 p=0.182	rs=-0.08 p=0.440	rs=0.34 p=0.001*	rs=-0.00 p=0.980	rs=0.34 p=0.001*	rs=0.26 p=0.014*	rs=0.15 p=0.152	rs=0.10 p=0.360
Exercise/stretch	rs=0.24 p=0.023*	rs=0.24 p=0.023*	rs=-0.09 p=0.407	rs=0.16 p=0.134	rs=0.11 p=0.292	rs=0.14 p=0.190	rs=0.12 p=0.243	rs=0.17 p=0.117	rs=0.27 p=0.009*
Coping self-statements	rs=0.28 p=0.009*	rs=0.12 p=0.275	rs=0.13 p=0.235	rs=-0.11 p=0.301	rs=0.29 p=0.005*	rs=0.10 p=0.357	rs=0.12 p=0.270	rs=0.01 p=0.962	rs=-0.06 p=0.582
Seeking social support	rs=0.52 p<0.001*	rs=0.38 p=0.001*	rs=0.22 p=0.041*	rs=0.19 p=0.067	rs=0.42 p<0.001*	rs=0.30 p=0.004*	rs=0.26 p=0.012*	rs=0.01 p=0.923	rs=-0.01 p=0.902

PL-CPCI-42 – Polish language version of the Chronic Pain Coping Inventory-42; CSQ-PL – Polish language version of the Coping Strategies Questionnaire; * p<0.05.

Table 6. Clinical characteristics and PL-CPCI-42 results.

PL-CPCI-42 subscales	CLBP duration	Spine overload	Symptoms	Recreational sport activity	Smoking	Earlier physical therapy	Continuous use of opioid
Guarding	rs=0.10 p=0.373	p=0.189	p=0.038*	p=0.013*	p=0.863	p=0.622	p=0.542
Resting	rs=-0.01 p=0.977	p=0.336	p=0.603	p=0.603	p=0.542	p=0.213	p=0.480
Asking for assistance	rs=0.04 p=0.680	p=0.611	p=0.101	p=0.178	p=0.486	p=0.817	p=0.964
Relaxation	rs=0.10 p=0.364	p=0.526	p=0.094	p=0.460	p=0.561	p=0.790	p=0.337
Task persistence	rs=0.11 p=0.302	p=0.315	p=0.734	p=0.041*	p=0.169	p=0.886	p=0.341
Exercise/stretch	rs=0.03 p=0.798	p=0.853	p=0.752	p=0.077	p=0.748	p=0.166	p=0.908
Coping self-statements	rs=-0.08 p=0.443	p=0.383	p=0.448	p=0.648	p=0.526	p=0.632	p=0.113
Seeking social support	rs=0.14 p=0.205	p=0.443	p=0.321	p=0.629	p=0.690	p=0.851	p=0.138

PL-CPCI-42 – Polish language version of the Chronic Pain Coping Inventory-42; * p<0.05.

Table 7. Correlation between radiological findings and PL-CPCI-42 results.

PL-CPCI-42 subscales	Number of discopathy levels	Type of degenerative changes				
		Modic classification	Facet hypertrophy	Hypertrophy ligamentum Flavum	Osteophytes of vertebral bodies	Narrowing of the neural foramen
Guarding	p=0.678	p=0.204	p=0.235	p=0.146	p=0.388	p=0.816
Resting	p=0.891	p=0.070	p=0.823	p=0.848	p=0.997	p=0.371
Asking for assistance	p=0.531	p=0.127	p=0.273	p=0.618	p=0.636	p=0.043*
Relaxation	p=0.743	p=0.284	p=0.519	p=0.852	p=0.149	p=0.556
Task persistence	p=0.987	p=0.430	p=0.964	p=0.471	p=0.954	p=0.530
Exercise/stretch	p=0.453	p=0.086	p=0.924	p=0.323	p=0.950	p=0.420
Coping self-statements	p=0.084	p=0.690	p=0.588	p=0.559	p=0.548	p=0.253
Seeking social support	p=0.534	p=0.749	p=0.934	p=0.916	p=0.633	p=0.988

PL-CPCI-42 – Polish language version of the Chronic Pain Coping Inventory-42; * p<0.05.

stretch domain) was significantly correlated with the BPCQ-PL domain, measuring beliefs about internal or personal control of pain (IS) (rs=0.22).

Most of the PL-CPCI-42 subscales were significantly correlated with CSQ-PL subscales, except for guarding and resting domains. The asking for assistance domain was related to ignoring pain sensations (rs=0.33), catastrophizing (rs=0.21), and item 43 (rs=0.21); the relaxation domain was correlated with diverting attention (rs=0.37), reinterpreting pain sensations

(rs=0.31), ignoring pain sensations (rs=0.23), coping self-statements (rs=0.41), catastrophizing (rs=0.30), and behavioral activities (rs=0.27). The task persistence subscale was related to coping self-statements (rs=0.34) praying/hoping (rs=0.34) and behavioral activities (rs=0.26). The exercise/stretch domain was related to diverting attention (rs=0.24), reinterpreting pain sensations (rs=0.24), and item 44 (rs=0.27). The coping self-statements domain was related to diverting attention (rs=0.28) and catastrophizing (rs=0.29). The seeking social support domain was related to diverting attention (rs=0.52),

reinterpreting pain sensations ($r_s=0.38$), ignoring pain sensations ($r_s=0.22$), catastrophizing ($r_s=0.42$), praying/hoping ($r_s=0.30$), and behavioral activities ($r_s=0.26$).

Analyses by patient clinical characteristics

We also assessed the correlation between patient clinical characteristics and PL-CPCI-42 domains (Table 6). The only statistically significant correlations were between radiating pain and guarding (patients with neurological deficit use this strategy the most frequently, $p=0.038$) and between sports recreation practiced before the pain symptoms occurred and guarding (patients practicing recreational sport activities use this coping strategy less frequently, $p=0.013$) and task persistence domains (patients practicing recreational sport activities use this coping strategy more frequently, $p=0.041$).

Interestingly, considering radiological and magnetic resonance scan evaluation of lumbar disc herniation and coexisting spondylotic changes, only narrowing of the neural foramen is correlated with the asking for assistance domain (patients with these degenerative changes use this coping strategy less frequently, $p=0.043$) (Table 7).

Discussion

Numerous studies have proved that LBP severely affects multiple domains of psychosocial functioning, including social relationships, self-esteem, mood, family duties, life satisfaction, and independence in satisfying one's own needs. Because chronic pain syndrome is strongly associated with behavioral adjustment, it is important in analyses of pain adaptation to include an assessment of behavioral coping strategies in patients with CLBP [15].

In a study conducted in a Korean population with chronic pain for more than 3 months and/or recurrent back pain and with/without radiating pain, exercise/stretch and resting were frequently used as coping strategies, in contrast to asking for assistance and relaxation [25]. However, in our study of patients with CLBP due to discopathy and degenerative changes in the lumbosacral spine, guarding and coping self-statements were frequently used as coping strategies in contrast to an exercise/stretch strategy. Relaxation was a relatively rarely used coping strategy in both the Polish and Korean patient samples [25].

The analysis of the relation between chronic pain coping and detailed patient clinical characteristics revealed some interesting dependencies. The guarding domain was significantly correlated with pain radiating and practicing sports before the pain symptoms occurred and between sports recreation and task persistence domain. CLBP characteristics were significantly

related to 2 of 8 PL-CPCI-42 domains: asking for assistance and guarding. Additionally, after taking radiological evaluation of the degenerative spine disease into account, we found that patients with narrowing of the neural foramen used asking for assistance less frequently compared to patients in whom herniated lumbar discs and coexisting spondylotic changes were not diagnosed. However, other variables related to advancement of disc herniation in the lumbosacral spine, such as the number of discopathy levels or Modic classification, were not significantly associated with behavioral or cognitive chronic pain coping efforts.

Exercise/stretch, coping self-statements, and seeking social support were not related with any of the clinical characteristics of our study sample. We did not find any associations between PL-CPCI-42 results and CLBP duration, spine overload in anamnesis, smoking, earlier physical therapy, or continuous opioid use before surgical treatment. Therefore, our study found that chronic pain coping is more related to beliefs about control of pain, depression and disability, than to clinical state in patients with lumbar discopathy and degenerative changes.

Jensen et al. noted that most research failed to find significant correlations between pain severity and coping strategies, as measured by the CSQ subscales: ignoring pain and coping self-statements [4]. However, our study found that CLBP-related disability, as measured by the RMQ-PL, was significantly correlated with guarding, resting, asking for assistance, relaxation, coping self-statements, and seeking social support domains. These findings indicate that more severely affected patients used the above-mentioned strategies to cope with their pain more frequently. Interestingly, we demonstrated that task persistence and exercise/stretch coping strategies are not related to the ability to perform everyday activities.

Patients whose psychosocial functioning was characterized by high levels of disability, depression and pain reported more frequent use of passive or avoidant coping strategies [26]. Jensen et al. [15] found that guarding and resting were positively associated with depression and pain-related distress, but were negatively correlated with general activity. Task persistence had significant negative associations with depression and affective distress [15]. In contrast, our study found that depressive symptoms were positively correlated with asking for assistance, relaxation, and seeking social support domains, meaning that patients with severe mood disturbances used these pain coping strategies more frequently.

Clinical significance of study results

In our study design we attempted to investigate the relation of the behavioral and cognitive pain coping strategies to psychological variables, selected clinical and radiological evaluation

of lumbar disc herniation and spondylotic changes, and socio-demographic data. Our results extend previous findings concerning the associations between low back pain adaptation and important, pain-related, psychological variables, and supplement them with relations concerning beliefs about personal control of pain and selected clinical and radiological evaluation of lumbar disc herniation. Detailed analysis of LBP adaptation in terms of behavioral and cognitive coping efforts is of special importance, since it allows optimizing the effects of conventional treatment and creating multidisciplinary pain management programs [27–32].

Study limitations

There are some limitations to this study that should be pointed out. We did not aim to evaluate the effectiveness of the surgical procedure on chronic pain coping styles. Moreover, the present study does not provide information as to the nature of the development of pain coping styles or psychological problems over time, nor the influence of other factors on the perception of coping with spinal pain. Therefore, a longitudinal exploration of the above-mentioned variables in patients treated surgically or conservatively due to lumbar spinal pain is needed.

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Conclusions

The present study provides evidence that back pain characteristics, depressive mood, disability, and beliefs about personal control of pain are related to chronic low back pain coping styles. Of particular significance, most of the variables related to the advancement of disc herniation and spondylotic changes and socio-demographic characteristics were not associated with cognitive and behavioral chronic LBP coping efforts.

Further research with short- and long-term follow-up is needed to determine the associations between LBP-related anxiety, fear of movement, pain coping styles, and beliefs about the ability to control pain in relation to clinical characteristics of patients with LBP treated operatively.

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