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Original Scientific Article

OVERCOMING FEAR AVOIDANCE BEHAVIORS AND KINESIOPHOBIA IN PATIENTS WITH CHRONIC LOW BACK PAIN

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Abstract. *Chronic low back pain (CLBP) is a very complex medical, social and economic problem. Long duration and variability of symptoms can be frustrating for patients and lead to various psychological and behavioral changes, which can be expressed as an over-powering fear of movement and lead to avoidance behavior. The aim of this study was to highlight the importance of individually designed exercises (IDE) and cognitive-behavioral treatment (CBT) in the treatment of patients with CLBP who have signs of fear-avoidance behavior and kinesiophobia. One hundred and thirty patients were included in a prospective randomized study. Group 1 (G1; n = 35) had a combined IDE and CBT program. Group 2 (G2; n = 35) had IDE, without CBT. Group 3 (G3; n = 30) had standard group exercises for CLBP. Group 4 (G4; n = 30) was a control, patients did not have IDE or CBT. Waddel's Fear Avoidance Beliefs Questionnaire (FABQ) and Tampa Scale of Kinesiophobia (TSK), were used for monitoring and evaluation. Patients completed them at the beginning, at the end of the therapy, and also after 3 months. After therapy and three months later, a statistically significant reduction in symptoms in G1 and G2 was recorded, with better results in G1: FABQph = 4.77±3.83/5.51±4.02; FABQw = 2.31±3.69/2.94±4.19; TSK = 5.63±4.56/5.69 ± 4.55. (p <0.001). The combination of IDE and CBT is an effective therapy for CLBP patients with fear avoidance behaviour and kinesiophobia*.

Key words: *chronic back pain, exercises, cognitive-behavioral treatment, fear of movement*

Introduction

Rest and protective positions applied in the post-acute period of CLBP are desirable, adaptive responses to pain. However, maintaining this model of behavior for a longer time is unnecessary and can be harmful. The belief that any physical activity can worsen the patients` condition by reactivation of the initial injury often turns into a feeling of fear, which interferes with the rehabilitation process. The patient becomes preoccupied with his/her physical symptoms and turns all of the attention to the feeling of pain, to the extent that he/ she refuses to move and avoids performing any exercises. That kind of behavior leads to the progression of immobility and worsening of pain and disability. It also disrupts the healing process.

Excessive attention to each movement can lead to strict selection of activities of everyday life and avoidance of any movements that the patient believes can provoke or aggravate initially experienced pain, which usually lead to overprotective behavior and harmful inactivity. The abovementioned was recognized and explained back in 2000 with the first fear-avoidance model (Fig.1). Since then, the concept and applicability of this model has changed significantly. The main contribution was in the explanation of why the acute painful lumbar syndrome in some patients turned into chronic, and also in the possibility of early identification of those patients. The modern concept of fear-avoidance model connects individually experienced pain intensity, overwhelming feeling of pain - catastrophizing, exaggerated preoccupation with pain, behavioral disorders such as withdrawal and avoidance, disability, pathological passivity and excessive vulnerability / hypersensitivity. The connection between fear and anxiety on the one hand and chronic pain on the other can be seen through three dimensions: the fear of pain itself, the fear of work-related activities and the fear of certain movements that the patient recognizes as harmful [1].

Fear Avoidance Behaviors

In an attempt to explain how and why some patients develop chronic pain syndrome, Lethem et al, in 1983 [2], introduced the fear-avoidance model. The central point of this initial model was the fear of pain. *Confrontation* and *avoidance* were opposed as the ultimate, extreme, positive and negative responses to that fear. Avoidance as an undesirable reaction to pain that leads to persistence of symptoms and excessively increased feelings of fear that sometimes leads the patient into a phobic state. Avoidance behaviors cause a reduction in physical and social activities, which negatively influence patients` physical and mental condition, promote greater disability and disrupt the overall quality of life. It was noted that some CLBP patients were afraid of pain itself but also of various activities which they believed could cause even

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greater pain than one they were experiencing. Ten years after the first presented fear-avoidance model, Waddel et al. showed in their studies that only the patient's beliefs on harmful effects of physical and work- related activities could cause more damage to the ability to perform activities of daily living and also more frequent absence from work, than the pathoanatomical causes of pain itself, its duration and intensity. The same authors developed the Fear-Avoidance Beliefs Questionnaire (FABQ), which is a powerfull assessesment tool of the impact that fear of movement and work-related activities have on the overall functioning in CLBP patients [3].

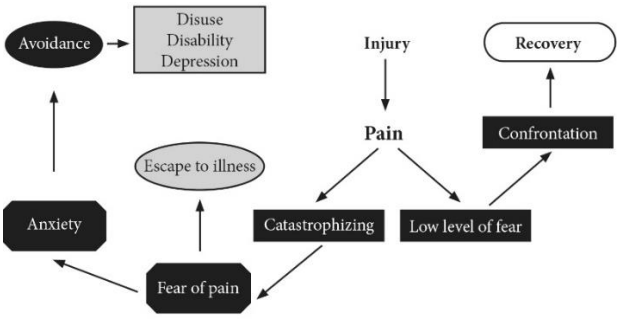

Fig. 1 Fear avoidance model of musculoskeletal pain (modified according to Asmundson et al. – based on the 2000 Vlaeyen / Linton fear-avoidance model) [4, 5]

Kinesiophobia

Special attention should be paid to a specific type of fear – the fear of movement and physical activities that the patient believes may cause or worsen an existing injury and aggravate pain. Kinesiophobia (kinesis - movement) as a term was introdused in 1990. This phenomenon was defined as: "excessive, irrational and incapacitating fear of physical movement and certain, from the patient perspective, risky activities, which is a consequence of the patient's vulnerability and higher exposure to re-injury and accompanying pain." [6]

Fear is a natural, immediate consequence of pain, and avoiding activities and movements that can reactivate the initial event is a normal response to acute pain, but can be a serious obstacle to recovery in the case of chronic pain syndrome. Anxiety and fear that often accompany chronic pain syndromes intensify and multiply the patients` experience of pain. Patients with CLBP who have an increased level of pain-related anxiety, tend to constantly expect even more severe pain and to fear re-exacerbation in advance. That kind of behavior usually leads to negative behavioral changes, most often in terms of reduced physical activity [7]. When patients with CLBP are exposed to a situation that frightens them (which can be climbing stairs, riding a bus, walking, going to the theater, etc.), they will show a kind of avoiding cognitive-behavioral response and excessive concern for their health, in a natural attempt to avoid a potentially risky situation and prevent pain aggravation and exacerbation of accompanied symptoms [8, 9].

Waddell et al. [3] suggested that avoiding the activities of everyday life and professional obligations was directly related to the degree of professional incapacity and job loss, regardless of the severity of the condition itself and the true intensity of the accompanying pain. The sentence from the study conducted by Crombez et al. [7]: “fear of pain and what we do about it is more disabling than the pain itself”, best explains this phenomenon. Subsequent studies have shown that CLBP patients, because of the fear, often exhibit prolonged inactivity and defensive, protective behavior [10, 11]. As a result, decrease in spinal mobility, muscle strength and cardiovascular endurance develops.

Klenerman et al. [12] found that fear avoidance is the most important predictor of chronicity in patients with back pain. Vlaeyen et al. [5,6] confirmed this in their work, showing that the fear of re-injury is a better predictor of the disability degree, than the intensity of pain and objective signs and symptoms of the condition themselves. They linked anxiety and fear with pain and spasm, successfully explaining the main problems in the treatment of CLBP.

Biopsychosocial Model for the Treatment of Patients with Chronic Pain

In the last twenty years, much has been said and written about the neuroanatomical pathways underlying CLBP, neuropsychological mechanisms that explain the complex feeling of pain, as well as the importance of both psychosocial factors in pain experience and individual response to nociceptive stimuli, and also how all of them can influence the success of the physical therapy. Pain is a complex perceptual experience that is influenced by psychosocial, social and biological factors. It is definite that chronic pain that have lasted for months, even years, will affect all aspects of the patient's functioning. Emotional, interpersonal, professional and physical life will be disrupted. With this in mind, patients suffering from chronic pain require attention and treatment not only of their physical, organic symptoms but also of a large number of factors that modulate and change the experience of pain and accompanying disability. To that end, Turk and Okifuji`s biopsychosocial model for the treatment of patients with chronic pain was created and accepted in 1999 [13]. Unlike one-dimensional models, both biomedical, which focus was only on the etiological and pathophysiological basis of the disease, and psychogenic, where pain and illness were presented as physical manifestations of a psychological disorder, biopsychosocial model combines purely mechanical and physiological processes with psychosocial influences that can cause, modify and prolong chronic pain. The biopsychosocial model presents illness as a dynamic and reciprocal interaction between biological, psychological, and sociocultural variables, which all shape a personal sense of pain [14]. This personal experience of pain is also in high percent, caused by the beliefs and convictions that each person acquires during their life. Based on his beliefs and the way patient accepts and experiences pain, he/she may choose to ignore the problem and continue working,

walking, socializing and maintaining similar level of previous activities, or may choose to leave work (temporarily or permanently), to cease all the activities and social interactions, accepting the role of the patient. Apart from personal prejudices and experiences, the influence of the environment, especially the spouse or other close family members, is not negligible. They can be promoters of both, healthy/active or unhealthy/passive response to pain and be that tongue on the scales that will judge if pain and illness will be dominating the patient's life. All of those aspects of the biopsychosocial model were the basis for the creation and application of CBT in the treatment of CLBP patients [15, 16].

The Aim

The aim of this study was to examine the effectiveness of individually designed exercises (IDE) and cognitive-behavioral treatment (CBT) in the therapy of patients with CLBP who have an over-protective posture and lack of natural body movements (avoiding activities that they think may reactivate or aggravate pain) and kinesiophobia (fear of movement).

Materials and Methods

A prospective randomized clinical study conducted at Clinic for physical medicine and rehabilitation UCC Niš, from March 2013 until December 2014, included 130 patients diagnosed with CLBP. The inclusion criteria were: over 18 years of age, pain in the lower back that lasted more than three months and clinical manifestation of lumbar instability combined with overprotective posture and lack of activities due to pathological fear of pain and body movement.

Prior to initiating therapy, subjects were informed of relevant research details. After the PMR specialist (physical medicine and rehabilitation specialist), had explained the reason and manner of their participation in the study, all the respondents signed the informed consent. .

The exclusion criteria from the study were: persons under 18 and over 75 years of age, bilateral radiculopathy or severe radiculopathy (myelopathy), complete stenosis of the spinal canal, recent injuries and surgical interventions in the lumbar region (in the last year), malignant and infectious diseases, and various organic diseases (lungs, heart, kidneys), which could limit the physical exertion, especially isometric muscle contractions.

After having taken a targeted anamnesis and in order to make an adequate diagnosis, a PMR specialist performed a clinical examination, which included assessment of posture, paravertebral muscle spasm, reflexes, the existence of radiculopathy and mobility of the lumbosacral spine. Specially designed kinesiological examination was also performed, including detection of: sign of instability, Gower's sign, reverse pelvic rhythm and excessive ligament laxity. Aberrant segmental mobility and pain provocation tests, such as instability test and passive extension test in prone position, were conducted. Strength and endurance of lumbar extensors and abdominal muscles were also measured.

Patients were randomly divided into four groups. They chose one of the three identical envelopes. Inside was a paper that assigned them to the protocol 1, 2 or 3. Control group 4 consisted of patients who could not come

Table 1 General information about the patients'groups

Group	G1		G2		G3		G4	
Gender								
female	23	(65.71%)	21	(60.00%)	20	(66.67%)	18	(60.00%)
male	12	(34.29%)	14	(40.00%)	10	(33.33%)	12	(40.00%)
Age (X±SD/(Me))	44.11 ± 10.53 (46.00)		50.91±11.33 (53.00)		48.03±12.44 (48.00)		46.23±12.83 (48.00)	
Education								
primary	0	(0.00%)	0	(0.00%)	3	(10.00%)	1	(3.33%))
high school	11	(31.43%)	13	(37.14%)	7	(23.33%)	12	(40.00%)
vocational	8	(22.86%)	12	(34.29%)	12	(40.00%)	6	(20.00%)
college	15	(42.86%)	10	(28.57%)	6	(20.00%)	10	(33.33%)
Master/PhD	1	(2.86%)	0	(0.00%)	2	(6.67%)	1	(3.33%)
Marital status								
married	15	(42.86%)	20	(57.14%)	21	(70.00%)	19	(63.33%)
live with	3	(8.57%)	1	(2.86%)	4	(13.33%)	1	(3.33%)
divorsed	8	(22.86%)	7	(20.00%)	3	(10.00%)	4	(13.33%)
widowers	2	(5.71%)	2	(5.71%)	1	(3.33%)	2	(6.67%)
single	7	(20.00%)	5	(14.29%)	1	(3.33%)	4	(13.33%)
Work								
active	13	(37.14%)	12	(34.29%)	14	(46.67%)	14	(46.67%)
sick leave	1	(2.86%)	2	(5.71%)	1	(3.33%)	4	(13.33%)
unemployed	15	(42.86%)	13	(37.14%)	8	(26.67%)	7	(23.33%)
housewife	1	(2.86%)	6	(17.14%)	5	(16.67%)	1	(3.33%)
student	3	(8.57%)	0	(0.00%)	1	(3.33%)	2	(6.67%)
retiree	2	(5.71%)	2	(5.71%)	1	(3.33%)	2	(6.67%)

to the therapy due to the distance from their place of residence or some other personal reasons.

Waddel's Fear Avoidance Beliefs Questionnaire (FABQ) and Tampa Scale of Kinesiophobia (TSK), were used for monitoring and evaluation. Patients completed them at the beginning, at the end of the therapy, and after 3 months.

Group 1 (G1; n = 35) had a combined IDE and CBT program. Group 2 (G2; n = 35) had IDE, without CBT. Group 3 (G3; n = 30) had standard group exercises for CLBP. Group 4 (G4; n = 30) was a control, patients did not have IDE nor CBT.

Individually designed kinesitherapy (IDE) was based on segmental spinal stabilization exercises. The exercise program was conducted in three phases:

Phase I – learning of joint isometric contraction of stabilizer muscles (formation and maintenance). At the beginning of the therapy, each patient learned how to form and maintain a protective lumbar muscle corset (by contracting the glutei muscles and retracting the lower abdominal wall) so that they could safely perform the dynamic part of the program.

Phase II – performing strengthening and stretching exercises. These are performed in a standing, sitting, kneeling and lying position. The obligatory set of exercises consists of elevation of the pelvic girdle (bridging), abdominal training, stretching of the back by extension and flexion of the back muscles (from a four-pronged position), postural correction and posterior inclination of the pelvic girdle (hook-lying). The program also contains a set of exercises on unstable support, which aim to activate the neural subunit of the dynamic lumbar segment and improve proprioception, coordination and balance.

Phase III – based on the incorporation of learned isometric contractions and active exercises into the activities of everyday life. It contains a simulation of the movements that patients most often perform in the work and social environment. The program also includes breathing exercises and ergonomic counseling.

Kinesitherapy treatment was individually composed and carried out in groups of a maximum 5 patients, for 3 weeks; altogether 15 therapeutic treatments, lasting from 15 to 30 minutes each (dosed-progressive), or 20 minutes (standard program for CLBP).

Cognitive-behavioral treatment (CBT) accompanied exercises. It was performed according to the principles of Beck's cognitive therapy for the treatment of patients with chronic pain [17]. In the practical implementation of the program, a therapeutic guide by Otis was used [18].

The program consisted of 12 sessions: 1. Initial interview and goal setting; 2. Education about chronic pain syndrome; 3. Theory of pain and diaphragmatic breathing; 4. Progressive muscle relaxation and imaging techniques; 5. Automatic thoughts of pain; 6. Cognitive restructuring; 7. Stress management; 8. Timing activities in order to avoid provoked pain; 9. Planning enjoyable activities; 10. Anger management; 11. Sleep hygiene; 12. Relapse prevention and control schedule .

Before the first session, patients were asked to complete the following forms:

- Pain Interview - an interview that includes: basic information about the patient; details about the beginning of the illness, intensity and character of pain, psychosocial anamnesis - schooling, marital status, recreational activities, etc [18].
- Goal Setting Worksheets - specific CBT goals (1-5), with the possibility of weekly monitoring. In the table extension, patients are asked to write down what would be the minimum, moderate or complete meeting of previously set goals [18].

In addition to these standard questionnaires, a large number of tables and worksheets were used during the therapy, in order to actively involve patients in their own therapeutic treatment.

Cognitive-behavioral treatment consisted of 12 sessions which were performed in groups of max 10 patients, 2 times a week, with the treatment duration of 90 minutes.

Statistical Analysis

The data collected from the questionnaires were classified and stored in the MS Office Excel database. Statistical analysis of the data was performed with the software package SPSS 15.0. The results of the data analysis were presented in a table. Continuous variables were represented by mean values and standard deviations (X±SD) and medians (Me) as a measure of central tendency. Categorical variables erre given as absolute numbers and percentages. The examination of the normality of the distribution of continuous variables was tested, depending on the sample size, by the Kolmogorov-Smirnov or Shapiro-Wilk test. Comparison of the values of continuous variables between two control periods, depending on the normality of the distribution, was performed by Student's t-test of dependent samples (in case of normal distribution) or Wilcoxon's Signed Ranks test (when distribution deviates from normal). The effect of the therapy in individual groups was determined by the Cohen's d parameter for dependent samples, which was calculated as: $d=\Delta X/\Delta SD$, where ΔX represents the mean of the changes and ΔSD represents their standard deviation. The limit values of Cohen's d are 0.2, 0.5 and 0.8, which differentiate between small, average and large effect of the therapy. Comparison of the age of the respondents between the groups was performed by ANOVA analysis and the consequent Post Hawk analysis. Testing the proportion of categorical variables between groups was examined by Pearson's χ^2 test or appropriate modifications of this test.

Results

Fear avoidance behaviors in CLBP patients were observed from two equally important angles: fear of physical activity and fear of work related activities, using Waddel's Fear Avoidance Belief Questionnaire (FABQ). Regarding patients fear of any physical activity, it was noted that immediately after the therapy and also after three months, all the

scores were statistically significantly lower (better) in groups G1 and G2 ($p < 0.001$), and higher in G3 ($p < 0.05$) and G4 ($p < 0.01$).

The effect of the therapy, based on Cohen's d value, was positive and very high in G1 and G2, and negative and completely insignificant in groups G3 and G4. Even after 3 months of therapy, the effect remained high and positive in G1 and G2, and negative, but now lower in intensity, in G3 and G4. It should be noted that in relation to the condition before therapy, the effect was more pronounced 3 months after therapy than immediately after, but only in group G1, while in the other three groups the effect was somewhat smaller.

Using the previously explained instructions for scoring in the examined groups, the following values of the scale for avoiding work (professional) activities were obtained based on the FABQ questionnaire: before, after and 3 months after the therapy. Scale scores have a higher value for greater avoidance of work (professional) activities.

Based on the data in table 3, it is evident that in relation to the scores before therapy, there was a statistically significant decrease of the measured values only in groups G1 and G2 ($p <0.001$), right after and 3 months after the therapy. In G3 and G4, the decline in the rate of avoidance of work -related activities was very small. Comparing groups G1 and G2, it was noted that scores after 3 months of therapy in G1 was lower than one immediately after therapy, while in G2 it was almost identical, which may speak in favor of more lasting effects of therapy used in G1. The therapy effect on reducing the avoidance of work-related activities was of a medium intensity immediately after therapy and after 3 months, while the effect in G3 and G4 was practically non-existent. This indicates that only implemented therapies in groups G1 (IDE+CBT) and G2 (IDE) had a positive impact on reducing fear of work-related activities.

Kinesiophobia in CLBP patients was evaluated by Tampa Scale of Kinesiophobia (TSK).

Based on the scoring instructions for this scale, higher scores indicate higher kinesiophobia, and their values, based on the TSK, taken before, after and 3 months after therapy are given in table 4.

Table 2 Waddel's Fear Avoidance Belief Questionnaire (FABQ): physical activities

	G1			G2			G3			G4		
before th	16.26 ±	4.74	(18.00)	16.34 ±	5.96	(17.00)	14.57 ±	5.61	(15.00)	15.80 ±	4.10	(16.00)
after th	11.49 ±	4.88	***(12.00)	13.49 ±	4.90	***(14.00)	15.20 ±	5.83	*(16.00)	16.40 ±	4.44	**(17.00)
after 3 m	10.74 ±	5.01	***(11.00)	13.40 ±	4.89	***(14.00)	15.10 ±	5.89	*(15.50)	16.33 ±	4.57	*(16.50)
aft/bef	4.77 ±	3.83	(4.00)	2.86 ±	2.14	(3.00)	-0.63 ±	1.27	(0.00)	-0.60 ±	1.16	(-0.50)
3m a/b	5.51 ±	4.02	(5.00)	2.94 ±	2.39	(3.00)	-0.53 ±	1.14	(0.00)	-0.53 ±	1.22	(0.00)
d aft/bef		1.25			1.33			-0.50			-0.52	
d 3 a/b		1.37			1.23			-0.47			-0.44	

* – p<0.05, ** – p<0.01, *** – p<0.001

^ Changes in scores compared to the period before Th (X ±SD, Me) and the achieved therapy effect (Kohens'd)

Table 3 Waddel's Fear Avoidance Belief Questionnaire (FABQ): work related activities

	G1			G2			G3			G4		
before th	17.51 ±	10.40	(16.00)	14.60 ±	11.75	(14.00)	17.10 ±	13.34	(16.00)	18.23 ±	14.71	(17.00)
after th	15.20 ±	9.46	***(12.00)	11.66 ±	10.16	***(11.00)	16.93 ±	12.92	(16.00)	18.00 ±	14.64	(16.00)
after 3 m	14.57 ±	8.91	***(11.00)	11.69 ±	10.23	***(11.00)	16.80 ±	12.69	(17.00)	18.00 ±	14.56	(16.00)
after/bef	2.31 ±	3.69	(3.00)	2.94 ±	4.47	(1.00)	0.17 ±	1.44	(0.00)	0.23 ±	1.55	(0.00)
3m a/b	2.94 ±	4.19	(4.00)	2.91 ±	4.56	(1.00)	0.30 ±	1.93	(0.00)	0.23 ±	1.55	(0.00)
d aft/bef		0.63			0.66			0.12			0.15	
d 3m a/b		0.70			0.64			0.16			0.15	

*** – p<0.001

^ Changes in scores compared to the period before Th (X ±SD, Me) and the achieved therapy effect (Kohens'd)

Table 4 Tampa scale of Kinesiophobia (TSK)

	G1			G2			G3			G4		
before th	39.9 ±	8.01	(40.00)	44.09 ±	6.92	(43.00)	43.03 ±	5.29	(43.50)	43.70 ±	4.53	(43.00)
after th	34.31 ±	6.37	***(33.00)	40.46 ±	5.98	***(40.00)	43.10 ±	6.19	(43.50)	43.83 ±	5.41	(44.00)
after 3 m	34.26 ±	6.40	***(34.00)	40.11 ±	6.15	***(39.00)	42.87 ±	6.07	(44.00)	43.53 ±	5.31	(44.50)
aft/bef	5.63 ±	4.56	(5.00)	3.63 ±	3.98	(4.00)	-0.07 ±	2.30	(0.00)	-0.13 ±	2.33	(0.00)
3m a/b	5.69 ±	4.55	(5.00)	3.97 ±	4.03	(3.00)	0.17 ±	2.21	(0.00)	0.17 ±	2.23	(1.00)
d a/b		1.23			0.91			-0.03			-0.06	
d 3ma/b		1.25			0.99			0.08			0.07	

*** – p<0.001

^ Changes in scores compared to the period before Th (X ±SD, Me) and the achieved therapy effect (Kohens'd)

Compared to pre-treatment values, significantly lower TSK scores were obtained, after therapy and 3 months after, in G1 and G2 ($p < 0.001$), while in G3 and G4 there were no statistically significant changes. The effect of therapy on the reduction of kinesiophobia was positive and high in groups G1 ($d = 1.23$ and 1.25) and G2 ($d = 0.91$ and 0.99), while it was completely insignificant in the other two groups. The intensity of the therapy effect was higher in the G1 group which, in addition to the experimental kinesitherapy treatment, also had cognitive-behavioral therapy.

The above mentioned results showed that in patients with CLBP, which presented a fear-induce avoidance behavior regarding physical and work-related activities, gradual introduction into kinesitherapy treatment had the greatest effect on pain, functionality and overall quality of life. Step by step exposure to the fearful exertions and movements induces the change in a patient's beliefs and preconceptions regarding activity and pain. The fear of movement and self imposed contrived body positions, held by a patient in order to avoid any unnecessary and potentially painful movements can be very difficult to overcome using only dosed physical activity. With this in mind, we can conclude that the necessity of CBT in the CLBP treatment is unquestionable.

Discussion

This study examined the effects of a combined individually designed and implemented kinesitherapy treatment for low back pain in combination with cognitive-behavioral therapy, on fear avoidance behavior and kinesiophobia in CLBP patients. Individually assembled and conducted kinesitherapy treatment, which consists of stabilization, strengthening and stretching exercises combined together, represents the basic therapy protocol for the patient with chronic low back pain [19]. On the other hand, the role of CBT had also proven to be very important. The various authors, over the years, compared the effect of CBT in relation to different kinesitherapy programs and also in relation to the combined exercises with CBT protocols [20]. Many of those studies showed that having CBT as a part of a treatment protocol, either alone or with exercises, significantly reduces not only pain itself, but also a fear of pain and kinesiophobia [21, 22].

In order to monitor the results of the treatment in this study, two very useful questionnaires were used: Waddel's Fear Avoidance Belief Questionnaire (FABQ) and Tampa Scale of Kinesiophobia (TSK). Swinkels-Meewissea et al. confirmed their validity for monitoring fear of pain in CLBP patients [23]. Studies by George et al. and Johnson et al. showed that these questionnaires could also be used as a predictive tool to isolate patients who may benefit from CBT, even on their first doctors' visit, before they developed chronic pain syndrome and all the accompanying physical and psychological complications [24, 25]. Their studies showed that patients who had a more pronounced fear of pain and physical activities before therapy, showed better results after CBT, than those who initially had a lower score of FABQ and TSK. In this way, we can predict whether the acute pain will become chronic and whether to include patients in CBT or not. This is very important, because this kind of treatment requires a lot of time and commitment from the patient and the physician both.

Leeuw et al. [1] in their study examined the effect of CBT on the treatment of CLBP patients that had had a fear of pain-related activities and found that CBT showed promising results in reducing these ailments, and thus indirectly affected the course, duration and outcome of CLBP. Vlaeyen and Morley [26] demonstrated in 2005 their idea that each patient should receive adequate treatment according to their characteristics, showing this in the group of patients who were treated only by general practitioners. They proved that the CLBP patients with previously recorded symptoms of catastrophizing and somatization did not have a positive outcome of treatment with classical methods. Jellema et al. [27] confirmed this statement when they included minimal cognitive interventions in the treatment plan of patients with CLBP. Those interventions were focused only on the recorded risk factors of chronicity (fear of movement, somatization, inadequate activities and body positions, exaggeration, etc.). Patients treated in this way had significantly better results.

In recent years, CBT has deservedly taken its permanent place in the CLBP treatment protocol. Numerous authors: Although Burns [28], Smeets [29], Spinhoven [30], Sullivan and Stanish [31], O'Sullivan [32] and many others applied different CBT techniques, they got positive results. The reduction of catastrophic symptoms and fear of pain and movement in CLBP patients was what all of these studies had in common. The abovementioned showed that not only classical CBT but also short targeted CBT interventions can have significant positive effects on pain and functionality in CLBP patient's treatment.

After all this has been said, it is clear that the fear of movement and accompanying maladaptive behaviors, presents important part of CLBP and plays a major role in selecting adequate therapy. What remains is a dilemma how to use this knowledge in preventing chronicity and fear avoidance behavior and kinesiophobia from even happening. After all this, what we can say for sure, is that in acute episodes of low back pain, these symptoms are often absent and there is no reason for using CBT. Also, in cases of subacute pain, some authors suggest short educations instead of a complete CBT program [33, 34, 35]. On the other hand complexity of CLBP is a clear indication for inclusion of CBT in treatment protocol. However, it is not still clear whether we can change future behavior of the patients altogether.if we only influence their thoughts and beliefs, explaining them that the fear of movement is unfounded and inadequate response. Additional research is needed in this direction. One of the certain benefits of this and similar studies is the fact that FABQ and TSK could be used as a prediction tool of chronicity in patients who are still in an acute or subacute stage of illness. In patients with a confirmed risk of prolonged and complicated low back pain, CBT can be used as a preventive measure so that patients do not develop chronic pain syndrome.

Conclusion

Combined IDE and CBT have had a positive effect on the frequency and intensity of pathological physical and psychosocial symptoms: fear avoidance behavior and excessive fear of movement (kinesiophobia), in CLBP patients. A statistically significant improvement was recorded both immediately after the therapy and three months later, which indicates the permanence of the effect of this experimental treatment.

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