

The Mediator Role of Psychological Morbidity in Patients with Chronic Low Back Pain in Differentiated Treatments

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Abstract

This study analyzed the mediating role of psychological morbidity and the variables that discriminated low versus high disability, in patients receiving physiotherapy and acupuncture. A total of 203 patients answered measures of illness and medication representations, coping, depression, anxiety, quality of life, and functional disability. Morbidity was a mediator between functional disability and quality of life. Treatment consequences and quality of life, in the acupuncture group, and emotional representations, quality of life, depression, anxiety, and active strategies for pain relief, in the physiotherapy group, discriminated patients with low versus high disability. These results have important implications for identifying high-risk patients.

Keywords

acupuncture, functional disability, low back pain, physiotherapy, psychological morbidity

Introduction

Low back pain (LBP) may be defined as “pain in the lower third of the spine, more specifically between vertebrae L1 and L5” (Rosenthal, 2003), often without specific cause (Campbell and Muncer, 2005), and in the overall population, the incidence is 5 to 10 percent (Queiroz, 1996). The prevalence of LBP is 15.4 percent for men and 18.9 percent for women, with a significant difference between the sexes. For men, prevalence increased from 12.6 percent for the age group 30–44 years to 16.8 percent for the age group 45–54 years and 19.7 percent for the age group 55–64 years. Among women, the prevalence increased from 16.4 percent to 20.6 percent, 21.9 percent, respectively (Gourmelen et al., 2007).

This condition affects males and females equally and appears to occur in any type of job. Most people become pain free within 3 months (Krismer and Van Tulder, 2007), but in some cases, patients start to have more crises and the pain exceeds 3 months. In this case, chronic LBP limits day-to-day activities,

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causing difficulties at work, changes in mood and sleep patterns, (Sardá et al., 2000), depression, and impairment on activity level (Huijnen et al., 2010).

Acute pain is defined as pain lasting less than 3 months. However, some conditions have transitioned from acute to chronic pain (pain persisting over 3 months; International Association for the Study of Pain, 1986), without specific etiology. Chronic LBP, however, is not the result of a specific disease or diseases, rather, it includes a set of causes such as sociodemographic factors including age, gender, and years of education; health-risk factors such as smoking; and heavy physical work. Other factors include obesity and psychological morbidity, making LBP a syndrome of multifactorial etiology (Keyserling et al., 2000).

In addition to LBP, patients usually show changes in lumbar flexibility, relaxation, and static balance (Luoto et al., 1998). The initial damage to the spinal column can lead to muscle stiffness and, consequently, inadequate circulation, which encourages and accentuates the pain and can lead to long-term immobilization, enhancing the chronicity of pain (Abenhaim et al., 2000; McGorry et al., 2000). In addition, Truchon et al. (2008) found, in patients with LBP, that avoidance coping explained functional disability.

The way patients perceive and represent pain affects how they cope with it and their reactions to physical symptoms. In addition, pain perception is influenced by each individual's personal perspective on health and disease (Reis, 2005). An individual's behavior and attitudes regarding pain and the meaning attributed to symptoms are modifiable factors in the perception of illness and the development of chronic symptoms and/or functional limitations. Therefore, behavior and reactions to pain make no sense without the evaluation of pain manifestations (Pinctus, 2006). Furthermore, cognitions provide patient with a scheme that enables them to understand pain and the information regarding care and procedures that helps to handle (Ogden, 2004). Cognitive representations of

illness influence health behaviors (Conner and Norman, 2005), and the beliefs and attitudes toward doctors and how they manage the treatment of the disease influence the outcome of the therapy and the use of health services (Fullen et al., 2006). Moreover, people develop beliefs about drugs, regardless of direct experience with a disease, which can influence health-related behaviors (Figueiras et al., 2007) that have an impact on therapeutic adherence (Menckeberg et al., 2008).

Functional disability is defined as the restriction of the individual's ability to perform normal activities of daily living, including defined roles within a particular environment and social and cultural understanding. Functional disability is a consequence caused by chronic LBP (Jonsdottir et al., 2010). Functional disability has an extensive negative impact on the individual's quality of life and leads to greater need for both formal and informal assistance for longer periods (Melzer and Parahyba, 2004). Chronic LBP can lead to changes in lumbar flexibility (Taimela et al., 1999), culminating in functional disability, including the inability to flex and rotate the spine, and resulting in immobilization (Abenhaim et al., 2000; McGorry et al., 2000). Patients who had a physical disability and were more functionally disabled were more depressed, had a more negative perception of their health, lower levels of humor, and were also less satisfied with visits from their families and friends (Lamb, 1996). Clarke (2003) carried out research with older people and concluded that chronic diseases and the resulting disability can significantly affect the patient's quality of life.

Coping with pain is a process in response to a stressful or negative event that includes the individual's efforts to deal with the pain (Turk and Okifuji, 2002). The strategies used to deal with pain interfere with the way patients perceive pain. Heppner et al. (1998), DeGood (2000), Tan et al. (2001), and Conner et al., (2006) suggest that earlier on, depressed individuals exhibited a hidden vulnerability in how they managed chronic pain. Mok and Lee

(2008) showed that anxiety and depression were not only associated with pain intensity but also predicted pain intensity, in patients with LBP. Many patients with LBP who experience the effects of depression and anxiety have restricted mobility and poor quality of life, preventing them from working (Smith et al., 2002).

The goal of the present study was to evaluate whether depression and anxiety were mediating variables in the relationship between disability and quality of life and to discriminate patients, according to level of disability (low versus high), in differentiated treatments: conventional physiotherapy versus acupuncture.

Method

Participants

A total of 203 patients participated in the study (90 in acupuncture treatment and 113 in physiotherapy treatment). Mean age was 51.64 years, with a slightly higher mean age of 55.27 years in the acupuncture group (AG) compared to the physiotherapy group (PG) with a mean age of 48.75 years. In the AG, the majority, 72.2 percent, were women while in the PG, 57.5 percent were men. The percentage of married patients was 75.5 percent in the AG and 79.7 percent in the PG.

In the AG, 33.3 percent of patients had completed high school. Only 3.5 percent of PG patients completed university, and the majority completed only 4 years of education (52.2%). In the AG, 25.8 percent completed 9–11 years of school education and 60 percent were active workers versus 23.9 percent in the PG. Mean duration of LBP was 69 months (90 months in AG and 53 months in PG).

Procedure

Several acupuncture and physiotherapy clinics in northern Portugal were invited to participate. For those that accepted, clinical directors were asked to participate in the study. All data-collection instruments were

administered to patients at the end of the fifth treatment, since “satisfaction with care” was one of the variables included in the assessment. Using a written script, staff members explained the research objectives to patients and ensured the confidentiality of their responses. Patient involvement was voluntary, and all participants signed an informed consent. The criteria for inclusion in the study were the following: suffering from back pain for more than 3 months, not doing any other treatment for the pathological condition causing the pain, being at least 20 years old, and willing to undergo physiotherapy or acupuncture without another type of treatment for LBP except pain medication.

Methods

The following instruments were used:

- *Illness Perception Questionnaire (IPQ-R)* (Figueiras et al., 2007). This questionnaire includes three distinct sections. In the first section, subjects are asked to identify symptoms associated with back pain. The second section includes 38 items divided into 7 subscales: Duration, Cyclic Duration, Consequences, Personal Control, Treatment Control, Coherence, and Emotional Representation. Alphas in this sample, ranged from .70 to .78 with the exception of personal control and cyclic duration’s subscales, that were below .70, were not considered in the hypothesis testing.
- *Means to Cope with Pain Questionnaire* (Brown, 1987), Portuguese version by McIntyre et al. (2004). The scale consists of 18 items divided into 3 subscales: Transformation of Pain, Pain Distraction, and Active Strategies for Pain Relief. For all subscales, a higher result indicates more strategies to deal with pain. Alpha was .77 for subscale Transformation of Pain, .59 for Pain

Distraction, and .74 for Active Strategies for Pain Relief.

- *Questionnaire of Beliefs about Medicine (BMQ)* (Horne, 2006), Portuguese version by Pereira and Roios (2007). The scale consists of two sections: (1) BMQ-specific and (2) BMQ-general. The first section assesses the representations of prescribed medicines for personal use, while the second section assesses beliefs about medicines in general. Higher results, in each subscale, indicate more use of strategies to cope with pain. In this sample the alpha was .74 for the specific subscale and .73 for the general subscale.
- McIntyre, T., Pereira, M.G., Soares, V., Gouveis, J., & Silva, S. (1999). *Escala de Ansiedade e Depressão Hospitalar*. [Hospital Anxiety and Depression Scale] Portuguese version of Research. University of Minho. Department of Psychology, Braga, Portugal. The scale consists of 14 items, divided into 2 subscales, one for anxiety and another for depression, each with 7 items. Cronbach's alpha for the Anxiety subscale was .80 and .75 for Depression.
- *Short-Form General Health Survey (MOS 20)*, (Stewart et al., 1998), Portuguese version by Geada (1996). The MOS 20 is a scale consisting of 20 questions on 6 dimensions of quality of life: Physical Functioning, Social Functioning, Roles, Mental Health, General Health and Pain. Higher results indicate a better quality of life. In this study only the total scale was used. In this sample, the cronbach's alpha was .90 for the total scale.
- *Functional Disability Questionnaire (RMDQ)* (Roland and Morris, 2000), Portuguese version by Pereira and Ferreira (2009). This instrument evaluates physical limitations resulting from reported pain on the lumbar spine and consists of 24 questions that describe the actual location of pain. Higher scores indicate more disability. Cronbach's alpha was .84, in this sample.

Data analysis

To assess whether psychological morbidity functioned as a mediating variable, two analyses were conducted. The first analyzed the effects of anxiety as a mediator in the relationship between functional disability and quality of life, and the second analyzed the effects of depression as a mediator in the relationship between functional disability and quality of life according to the causal step methodology (Baron & Kenny, 1986; Preacher, Rucker, & Hayes, 2007). To discriminate between the groups, low incapacity versus high incapacity, a discriminant analysis was performed for the AG and the PG.

Results

Anxiety and depression as mediating variables in the relationship between functional disability and quality of life

Since the two groups (PG and AG) were not distinguished in the mediator variable (both p values were not significant: $p = 0.089$ for anxiety and $p = 0.224$ for depression) and the results for each group were the same with only a few slight deviations in results, the authors chose to present the results for the overall sample.

The standardized correlation coefficient associated with the effect of functional disability with quality of life (path c) was significant ($\beta = -.492, p < .01$). Thus, the first requirement for mediation was fulfilled. The standardized coefficients associated with the relationship between the predictor and the possible mediator (path a) were significant ($\beta = .272, p < .01$), and therefore, the second requirement was met. To test whether anxiety was related to quality of life, functional disability and the mediator were entered simultaneously as predictors of quality of life. The standardized coefficient associated with the relationship between anxiety and quality of life was significant (path b), ($\beta = -.522, p < .01$). Finally, this same regression equation showed that the correlation coefficients between functional disability and quality of life (control-

Table 1. Results of regression analysis for anxiety as a mediator in the relationship between functional disability and quality of life ($N = 203$).

Steps in Mediation Model	Adjusted R^2	Stand β	t
Step one (path C)			
Dependent variable: quality of life	.242	-.492**	-8.013
Predictor: functional disability			
Step two (path a)			
Dependent variable: anxiety	.074	.272**	4.009
Predictor: functional disability			
Step three (path b and c)			
Dependent variable: quality of life	.494	-.522**	-9.990
Moderator: anxiety (path b)			
Predictor: functional disability (path c')		-.350**	-6.698

** $p < .01$.

Table 2. Results of regression analysis for depression as a mediator in the relationship between functional disability and quality of life ($N = 203$).

Steps in the Mediation Model	Adjusted R^2	Stand β	t
Step one (path C)			
Dependent variable: quality of life	.242	-.492**	-8.013
Predictor: functional disability			
Step two (path a)			
Dependent variable: depression	.074	.343**	5.173
Predictor: functional disability			
Step three (path b and c)			
Dependent variable: quality of life	.496	-.541**	-10.173
Moderator: depression (path b)			
Predictor: functional disability (path c')		-.307**	-5.762

** $p < .05$.

ling the mediator) were significant (way c') ($\beta = .350$; $p < .01$) (see Table 1). Therefore, anxiety was a partial mediator of the relationship between functional disability and quality of life (intensity of mediation: 29%).

The second mediation allowed the analysis of the mediation effects of depression in the relationship between functional disability and quality of life. The results presented in Table 2 show that the standardized value of the correlation coefficient associated with the effect of disability on the functional quality of life (via c) was significant ($\beta = -.492$, $p < .01$). Thus, the first requirement for mediation fulfilled. The

standardized coefficients associated with the relationship between the predictor and the possible mediator (path a) also showed significance ($\beta = .343$, $p < .01$), meeting the second requirement. To test whether depression was related to quality of life, functional disability and the mediator were entered simultaneously as predictors of quality of life. The standardized coefficient associated with the relationship between depression and quality of life (path b) were significant ($\beta = -.541$, $p < .01$). Finally, this same regression equation showed that the correlation coefficients between functional disability and quality of life (path c') (controlling the

mediator) were significant ($\beta = -.307, p < .01$). Depression is thus a partial mediator of the relationship between functional disability and quality of life (intensity of mediation 38%).

Discrimination between patients with low functional disability versus high functional disability, in the acupuncture treatment

Based on the evaluation of disability in LBP, patients were categorized as low versus high functional incapacity according to the cutoff score of the Functional Disability Questionnaire (11) (Rolland, 1995). Low functional disability is characterized by a failure, in which patients may experience more pain and problems with sitting, lifting, and standing. In addition, patients have difficulty traveling and participating in social events. Personal care, sleep, and sexual activity are not much affected, and conservative treatment may be sufficient. In the group with high functional disability, pain is a problem, and patients have significant difficulties in traveling, attending to their personal needs, social life, sexual activity, and sleep; thus, back pain has an impact on all aspects of daily life, including work.

In order to uncover the psychological variables that distinguish patients in both groups, a discriminant analysis was performed. In each situation, a stepwise method of discriminant function was statistically significant in discriminating between the two groups. The variables that discriminate patients with low disability from patients with high disability, in the AG, were the following: perception of the consequences (illness) and quality of life, in which lower values (negative: mean = $-.839$) of the function correspond to patients with high disability and higher values (positive: mean = $.224$) of the function correspond to patients with functional low disability. Function values were inversely correlated with functional disability, that is, higher values represent less disability. In the AG, patients with better total quality of life perceived fewer consequences of their disease

and, as a result, showed the lowest functional disability.

The conclusion of the stepwise analysis provided evidence of a canonical discriminant function with results of significance (Wilks' Lambda = $.839, \chi^2 = 15.318, p < 0.001$), concluding that the discriminatory power of the function was significant and that both groups were significantly different. The percentage of cases correctly classified was 74 percent, the canonical correlation was $.402$, and the proportion of unexplained variance was $.839$.

Discrimination between patients with low functional disability versus high functional disability, in the physiotherapy treatment

The variables that discriminated patients with low disability from those with high disability were the following: representation of emotional illness, total quality of life, depression, anxiety, and active strategies for pain relief. The results of the discriminant analysis showed lower values (negative: mean = $-.718$) of the function to correspond to patients with high disability and higher values (positive: mean = $.550$) of the function to correspond to patients with low disability. The function value is inversely correlated to patients' functional incapacity, namely, higher values indicate less disability.

In the PG, patients with more negative illness representation, more depression, more anxiety, more active coping strategies, more strategies to transform pain, and lower quality of life were those with the greatest functional disability. The variable that assumed greater importance was quality of life. The conclusion of the stepwise analysis provided evidence of a variable or canonical discriminative function with significant results (Wilks' Lambda = $.713, \chi^2 = 36.819, p < .001$). The power of discriminatory function was significant, and both groups were significantly different. Emotional representations of illness, quality of life, anxiety, depression, and active strategies for pain relief, and the transformation of pain distinguished the

two groups. The percentage of cases correctly classified was 76 percent. The canonical correlation was .535, and the proportion of unexplained variation was .713.

Discussion

In the assessment of psychological morbidity as a mediator in the relationship between functional disability and quality of life, the results showed that anxiety and depression were partial mediators of the relationship between disability and quality of life, and this relationship is mediated in 38 percent by depression and in 29 percent by anxiety. Currie and Wang (2004) found in patients with chronic LBP, a relationship between pain and depression, and both variables were associated with greater disability. In addition, Currie and Wang (2004) found patients' disability with LBP to be associated with depressive symptoms. Berlin and Fleck (2007) also found a relationship between depression and quality of life. The authors report that depressed patients had deficits in quality of life that were directly attributable to mood disturbance.

Berber et al. (2005), studying patients diagnosed with fibromyalgia, concluded that depression was related to low levels of quality of life dimensions of physical functioning, pain perception, social functioning, mental health, emotional functionality, and general health perception. According to the authors, depression negatively influences the quality of life of patients by increasing the feelings of pain and disability, and patients can present a tendency to isolation, feelings of defeat, and frustration. Romão et al. (2009) found that in patients with chronic pelvic pain, those with anxiety and depression had a poorer quality of life, leading them to conclude that anxiety and depression have a negative impact on quality of life. Matthew et al. (2008), in a study with patients suffering from chronic musculoskeletal pain, concluded that the combination of depression and anxiety with chronic pain were strongly associated with more severe pain, greater

disability, and poorer quality of life. In addition, Tan et al. (2008) found an association between negative emotional experiences (depression and anxiety), pain, and functional disability.

Serpa and Cruz (2005) found a significant association among depression, anxiety, and somatization associated with LBP. In addition, Mok and Lee (2008), in a study that assessed the relationship between anxiety, depression, and pain intensity in patients with LBP, found that anxiety and depression were positively related to pain intensity. The authors also concluded that anxiety and depression were not only related to pain intensity but were also predictors of pain intensity.

The relationship between psychological morbidity and functional disability involves several distinct phases over time, and each stage involves different social interaction processes. Wadell (2004) found a relationship between depression and functional disability. Other studies with chronic-pain patients found a relationship between psychological morbidity (depression and anxiety) and functional disability (Bair et al., 2008; Farmer et al., 2009; Mok and Lee, 2008), which explains its role in influencing the relationship between disability and quality of life.

In the AG, patients who perceived a lower impact of the disease also showed lower functional disability. These results are in accordance with studies that have shown a relationship between quality of life and functional incapacity. Carr et al. (2001) state that quality of life represents a subjective individual experience that is directly related to disability.

Furz et al. (2002) argue that the beliefs patients have about LBP can contribute to a worsening of the disease, causing patients to feel more or less incapacitated. Clarke (2003) found a relationship between the quality of life and disability, that is, those who were more functionally impaired had more negative mood levels and less satisfaction with family and friends, indicating lower quality of life. In the PG, patients with more negative representations, more depression, more anxiety, more active

strategies for pain relief, and impaired quality of life had a higher functional disability. Since disability is influenced not only by medical conditions but also by psychological factors, particularly psychological morbidity, these results come as no surprise (Brenes et al., 2008).

Interestingly, patients with more disability reported the use of active coping strategies. This result is probably due to patients' search for several coping strategies in their pursuit to alleviate their pain. One may hypothesize that passive coping strategies may have not been efficient, and the use of active coping strategies may serve as an indicator of patients' struggle and frustration to control the pain. Therefore, it is not surprising that active coping may be associated with greater anxiety, depression, and functional disability. Future studies should test this hypothesis.

High levels of depression were associated with more disability. This result is in accordance with Currie and Wang (2004), in patients with chronic LBP, who found a relationship between depression and disability. In turn, representations of the disease also contribute to functional disability, and this result is in accordance with Rabelo and Cardoso (2007), who refer to disability as a situation influenced by cognitive factors.

Vinaccia (2005) observed a relationship between disability and depression. In addition, Berber et al. (2005), in a study of patients with rheumatoid arthritis, assumed the negative representations may have an opposite effect, that is, the negative effect is associated with perception of greater functional disability (Ramos, 2003). Several authors found a relationship between illness perceptions and psychosocial variables. Weinman et al. (2006), in a study of coronary patients, found that illness representations were an important predictor of quality of life. Scheepers et al. (2006) concluded that patients with osteoarthritis, who reported more disability, were those who strongly believed that their osteoarthritis had a great impact on their daily activities. Frostholm et al. (2007) showed that the perceptions that

patients have of their illness (duration, consequences, and emotional representations) predicted their physical and mental health as well as their perception of disability.

Limitations

The present study does not explain different cognitive representations of illness in each group and whether the differences developed during treatment (patients were evaluated after the fifth treatment) or existed prior to the choice of treatment. Thus, in future studies, it would also be important to assess the representations and disability, at various stages, during treatment. It is also important that future studies use clinical variables including body mechanics in order to better evaluate the functional capacity of patients and overcome the limitations inherent to self-assessment measures.

This study focused on the perceptions and representations of back pain as an illness and not on the perception of pain itself. However, future studies should question patients regarding their perception of pain, since this perception is associated with psychological morbidity and coping strategies. Another important aspect, in future studies, should address what significant others think about the patient's LBP since disbelief in one's condition may be perceived as lack of social support and increase psychological morbidity, as well (Newton et al., 2010).

Conclusion

The results of this study emphasize the need for a psychosocial assessment of the patient who suffers from back pain, since psychosocial variables proved critical in the discrimination of patients with high versus low disability. According to results, it is particularly important to assess the impact of pain on patients' psychological morbidity, since both depression and anxiety are mediators in the relationship between functional disability and quality of life. In terms of risk, it is also important that patients, when they seek medical attention for pain

problems, are evaluated on those variables that discriminate low versus high functional disability. Such screening could be paramount in identifying patients who may need psychological help in coping with pain, regardless of treatment of choice.

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- Zigmond AS and Snaith RP (1983) Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica* 67: 361–363. Table 2. Results of regression analysis for depression as a mediator in the relationship between functional disability and quality of life ($N = 203$).