Factors Affecting Disability With Nonspecific Low Back Pain in Different Subgroups: A Hierarchical Linear Regression Analysis

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Abstract

Purpose: To systematically explore how disability is influenced with layers (demographic level, pain level and psychosocial factors) in nonspecific low back pain (NSLBP) in different subgroups.

Methods: This is a cross-sectional study that compared two different subgroups in NSLBP at two hospitals. Hierarchical multiple regression analysis was performed to analyse factors affecting disability in different groups (overall group, acute group and subacute/chronic group).

Results: In the overall group (n = 235), explanatory power increased with each additional variable in the order of demographic characteristics, pain intensity and psychosocial factors. Pain intensity (ß = 0.219), Pain Catastrophising Scale (PCS) (ß = 0.175) and Pain Self-Efficiency Questionnaire (PSEQ) (ß = −0.370) were significantly associated with disability. In the acute group (n = 65), explanatory power improved with each additional variable for the disability in the order of demographic characteristics, pain intensity and psychosocial factors. Ultimately, pain intensity and PSEQ had significant explanatory power, with pain having the most influence. However, in the subacute/chronic group (n = 170), explanatory power increased with each additional variable in the order of demographic characteristics, pain intensity and psychosocial factors and all, including psychosocial factors, had a strong impact, with self-efficacy having the most substantial impact on disability.

Conclusion: Depending on the duration of the disease, the factors affecting the disability differed, with pain having more influence than psychosocial factors in the acute phase and psychosocial factors having more influence in the chronic phase.

Introduction

Low back pain (LBP) has become a global problem, and medical costs are increasing every year [1]. In LBP, 80–90% are classified as nonspecific low back pain (NSLBP), which cannot be attributed to a structural problem [2]. In NSLBP, one of the most important outcomes is disability, and it is widely known that pain influences disability [3]. Pain intensity at the onset can contribute to chronicity [4]. Also, psychosocial factors influence the disability of LBP, especially chronic low back pain (CLBP) [5]. Specifically, psychosocial factors include fear of movement, catastrophic thoughts of pain and self-efficacy. Alma et al. reported that the factors that contributed to chronicity after one year were high fear of movement and older age as well as the intensity of pain at the beginning of the disease [6]. Fear of movement is known as the fear-avoidance model [7] and is believed to contribute to functional impairment and chronicity of LBP [8].

Fear of movement is an important predictor of failure to return to work [9]. Furthermore, a study on Saudi Arabians with CLBP reported that there was an association between psychosocial factors, including fear of exercise and disability [10]. In terms of self-efficacy, not only is it related to pain intensity and disability but also a correlation between low self-efficacy and physical function has been reported [11]. For example, in LBP patients, pain intensity and lumbar potential and stability during lifting movements were

reduced [12]. In terms of catastrophic thinking for pain, in a systematic review of LBP by Wertli et al., they reported that catastrophic thinking is associated with disability and may contribute to chronicity [13]. Thus, from previous studies, it is clear that many factors, such as pain intensity, psychosocial factors and age, are involved in the disability of LBP. However, no studies have systematically examined which factors have more substantial impact on the disability in NSLBP among pain, various psychosocial factors and even demographic data such as age. Furthermore, most of such studies were on CLBP, and few studies examine how pain intensity and psychosocial factors affect the disability in NSLBP as a whole or acute LBP. That is to say, depending on the duration of the disease, factors affecting the disability of LBP may differ, but we have not found any studies that examine the magnitude of the effects of pain intensity and psychosocial factors in different duration of the disease.

Therefore, this study aimed to systematically explore how disability is influenced with layers (demographic level, pain level and psychosocial factors) in NSLBP using hierarchical multiple regression analysis and to examine them by the duration of the disease to see if there are any different effects. Our hypotheses were as follows: First, pain intensity influences the disability, and psychosocial factors still influence the disability, even based on pain intensity. Second, the influence of psychosocial factors would be more remarkable in CLBP, whereas psychosocial factors are less in acute LBP.

Materials And Methods

Study design

This is a cross-sectional study that compared two different subgroups in LBP at two hospitals was performed according to the STROBE statement. Written informed consent was obtained from the patients before the study. The study was conducted in compliance with the Declaration of Helsinki and was conducted with the approval of the Ethics Committee of Sapporo Maruyama Orthopaedic Hospital (no. 0039) as well as the Faculty of Health Sciences, Hokkaido University (approved no. 20–58).

Participants

This study included patients collected from the two medical institutions between January 2019 and December 2020. The inclusion criteria of the participants were as follows: (1) over 20 years old; (2) diagnosed as NSLBP by an orthopaedic surgeon, with pain occurring in the lumbosacral region with radiation limited above the knee, with or without referred pain and signs of nerve root compromise [2]; (3) no use of painkillers at the initial physiotherapy session and (4) being able to understand the Japanese language well enough to complete the questionnaires independently. The exclusion criteria included (1) presence of spinal deformities; (2) any history of surgery on the spine; (3) pregnancy; (4) rheumatological and/or inflammatory disease; and (5) other serious pathologies (e.g., pyogenic spondylitis and cauda equina syndrome). Subjects were divided into three groups: the "all LBP group," the "acute LBP group" with an onset of less than four weeks (28 days) and the "subacute/CLBP group" with an onset of more than 28 days.

Procedures

We collected data on age, sex, height, weight, medical diagnosis and duration of symptoms from medical records. Furthermore, we collected data on pain intensity, disability and psychosocial factors by patient-reported outcome measures (PROMs). For all participants, the following PROMs were evaluated immediately before the initial physiotherapy session: (1) an 11-point numerical rating scale (NRS) for pain intensity [14–15]; (2) Roland Morris Disability Questionnaire (RMDQ) for disability due to LBP [3]; (3) Pain Catastrophising Scale (PCS) for pain catastrophising [16]; (4) Tampa Scale for Kinesiophobia (TSK) for kinesiophobia [17]; and (5) Pain Self-Efficiency Questionnaire (PSEQ) for pain self-efficiency [18].

Measures

Pain intensity

NRS was used for LBP intensity. The 11-point NRS was used to measure pain intensity [14–15] to determine average LBP intensity on the day of evaluation. A score of 0 indicates no pain, and a score of 10 indicates the worst imaginable pain. Alghadir et al. assessed knee pain intensity with multiple scales, including the NRS, and demonstrated that NRS was valid [19].

Disability/functional status

The Japanese version of the RMDQ, which contains 24 dichotomous scales (No = 0; Yes = 1), was used [20]. A higher total score indicates more significant impairment due to LBP. Concurrent validity of the Japanese RMDQ, high internal consistency (Cronbach's alpha for all items = 0.86) and high test-rest reliability (0.95) have been clarified [20].

Pain catastrophising

To assess pain catastrophising, the Japanese version of the PCS, which consists of 13 items from 0 to 4, was used [21]. A higher total score indicates more significant deficits of pain catastrophising, with a total score of 30. This is the cut-off point for a clinically appropriate level of catastrophising [16]. The construct validity and high internal consistency of the Japanese version of the PCS (Cronbach alpha for all items = 0. 89) were shown [22].

Fear of movement

The Japanese version of the TSK, which consists of 17 items from 1 to 4, was used. A higher total score indicates strong fear of movement, with a total score of 37 being the cut-off for strong fear of movement [23]. The concurrent validity and high internal consistency of the Japanese version of the TSK (Cronbach alpha for all items = 0.85) have been confirmed [23].

Pain self-efficiency

The Japanese version of PSEQ, which consists of 10 items from 0 to 6, was used for pain self-efficiency [24]. A high total score indicates stronger self-efficacy for pain.

Data analysis

We excluded subjects with missing data in the demographic characteristics and measures. Descriptive analyses were used to understand the participants' characteristics. The test differences were compared between the two groups of patients with acute and subacute/chronic LBP for categorical variables using the Chi-square test. In contrast, Welch's test was conducted for continuous variables. The correlation of each outcome was examined for different groups (overall, acute and subacute/chronic groups) using Pearson's product-moment correlation coefficient to evaluate the association of other factors with disability. In this study, p-values of $\leqq 0.40$, $0.40-0.75$ and $\geqq 0.75$ were considered to indicate weak or no correlation, moderate correlation and strong correlation, respectively [25].

Furthermore, factors affecting disability in different groups were analysed through hierarchical multiple regression analysis. In multiple regression analysis, the dependent variable included the RMDQ for disability due to LBP, and the independent variables included the characteristics of the participants, pain intensity and psychological factors (PCS, TSK and PESQ). For all LBP group, the acute LBP group and the subacute/chronic LBP group, hierarchical multiple regression analysis was performed. Demographic characteristics including age, body weight and BMI were first entered (step 1) as control variables, followed by pain intensity in the second step (step 2) and finally, the psychological factors including the scores of PCS, TSK and PESQ were added in the third step (step 3) to test unique associations between the psychological factors and patients' disability beyond the effects of patients' demographic characteristics and pain intensity of LBP. HAD ver. 16.1 (Hiroshi Shimizu, Nishinomiya, Japan) was used to perform all statistical analyses [26]. All p-values are two-sided. The alpha level was set at 5%.

Results

Demographic data

In this study, the total number of participants was 235 (65 participants in the acute group and 170 participants in the subacute/chronic group). Table 1 shows the participants' demographic characteristics, including psychosocial factors.

Table 1
Characteristics of the participants

Patients	All (n = 235)	Acute LBP (n = 65)	Subacute/Chronic LBP (n = 170)
Age (*yr*), mean (SD)	56.31 (15.54)	53.36 (14.95)	57.44 (15.61)
Gender (*n of men*), (%)	94 (40.0)	30 (46.1)	64 (36.6)
Height (cm), mean (SD)	160.86 (8.67)	163.02 (8.69)	160.10 (8.530
Weight (kg), mean (SD)	62.09 (12.01)	64.52 (12.55)	61.15 (11.67)
BMI	23.90 (3.79)	24.16 (3.76)	23.79 (3.81)
Pain intensity over Low Back (*0−10*), mean (SD)	4.06 (2.20)	4.17 (2.41)	4.01 (2.13)
Roland-Morris Disability Questionnaire (*0−24*), mean (SD)	5.27 (4.30)	4.61 (4.33)	5.48 (4.29)
Pain Catastrophizing Scale (*0−52*), mean (SD)	21.60 (9.90)	19.48 (10.23)	22.30 (9.73)
Tampa Scale for Kinesiophobia (*17−68*), mean (SD)	35.92 (6.53)	34.47 (6.06)	36.48 (6.66)
Pain Self-efficiency Questionnaire (0−*60*), mean (SD)	40.66 (11.29)	41.71 (12.74)	40.266 (10.73)
SD, standard deviation			

Comparison of intergroup pain intensity, disability and psychosocial factors

Table 2 presents a comparison of pain intensity, disability and psychosocial factors between the acute and subacute/chronic groups. Only the value of TSK showed a significant difference between the two groups.

Table 2
Comparison of intergroup pain intensity, the disability and psychosocial factors

Patients	Acute (n = 65)	Subacute/Chronic (n = 170)	P value	95% CI for mean difference
Pain intensity over the low back (0–10), mean (SD)	4.17 (2.41)	4.01 (2.13)	.645	− .081 to .796
Roland-Morris Disability Questionnaire (0–24), mean (SD)	4.61 (4.33)	5.48 (4.29)	.221	-2.016 to .466
Euro QOL 5 Dimensions (0–1), mean (SD)	0.752 (0.132)	0.73 (0.10)	.109	− .003 to .061
Pain Catastrophizing Scale (0–52), mean (SD)	19.48 (10.23)	22.30 (9.73)	0.58	-5.675 to .028
Tampa Scale for Kinesiophobia (17–68), mean (SD)	34.47 (6.06)	36.48 (6.66)	.028	-3.890 to − .139
Pain Self-efficiency Questionnaire (0–60), mean (SD)	41.71 (12.74)	40.266 (10.73)	.420	-1.831 to 4.716
SD, standard deviation				

Correlation of disability, pain intensity and psychological factors

Table 3 shows a matrix of the correlations among the overall, acute and subacute/chronic groups. In the subacute/chronic LBP group, the highest correlations were found between RMDQ and PSEQ, $r = − 0.510$.

Table 3
A matrix of the correlations

	1	2	3	4	5	6	7
All LBP (n = 235)							
1.Age	1.000						
2.BMI	.044	1.000					
3.LBP	− .020	− .024	1.000				
4.PCS	− .047	0.46	.203**	1.000			
5.TSK	.080	.105	.072	.372**	1.000		
6.PSEQ	− .072	.013	− .042	− .268**	− .281**	1.000	
7.RDQ	.086	.056	.277	.350**	.275**	− .453**	1.000
Acute LBP (n = 65)							
1.Age	1.000						
2.BMI	− .082	1.000					
3.LBP	.100	− .134	1.000				
4.PCS	.082	.022	− .025	1.000			
5.TSK	.029	.207	.110	.418**	1.000		
6.PSEQ	.024	− .060	.036	− .216[+]	− .206	1.000	
7.RDQ	.069	.038	.275	.207[+]	.054	− .323**	1.000
Subacute/chronic LBP (n = 170)							
1.Age	1.000						
2.BMI	.097	1.000					
3.LBP	− .065	.020	1.000				
4.PCS	− .119	.064	.314**	1.000			
5.TSK	.076	.079	.065	.341**	1.000		
6.PSEQ	− .105	.042	− .084	− .286**	− .307**	1.000	
7.RDQ	.080	.067	.284**	.398**	.342**	− .510**	1.000
**p < .01, *p < .05, [+]<.10,							

	1	2	3	4	5	6	7
LBP, Low Back Pain; BMI, Body Mass Index; PCS, Pain Catastrophizing Scale; TSK, Tampa Scale for Kinesiophobia; PESQ, Pain Self Efficiency Questionnaire; RMDQ, Roland Morris Disability Questionnaire							

Hierarchical multiple regression analysis

Tables 4–6 show the hierarchical multiple regression analysis results for the overall LBP, acute LBP and subacute/chronic LBP groups.

Overall LBP group

The overall LBP group consisted of 235 participants. Table 4 shows the results. In step 1, the demographic variables were added. The results of hierarchical linear regression showed that participants' demographic factors, tested in step 1, explained 1.3% of the variance in the disability. There was no significant association between all demographic factors and worse disability. In step 2, we included pain intensity as a variable. The results of the hierarchical linear regression showed that the pain intensity, tested in step 2, explained an additional 7.6% of the variance in disability. Furthermore, there was a significant association between pain intensity and worse disability (p < 0.05). In step 3, psychological factors, which are TSK, PCS and PESQ, were included. The results of the hierarchical linear regression showed that psychological factors, tested in step 3, explained an additional 23.3% of the variance in disability. Furthermore, those that were significantly associated with disability were LBP (ß = 0.219), PCS (ß = 0.175), and PSEQ (ß = −0.370). This final model explained 32.2% of the variance in participant's disability.

Table 4
Results of hierarchical linear regression analysis for all participants(n = 235)

Model	Variables	Unstandardized Coefficients B(p)	Standardized Coefficients β	R² (ΔR²)	ΔF	p	AIC
1	Intercept	2.120 (.313)	.052	0.13	0.997	.395	1358.8
	Gender	0.456 (.430)	.084				
	Age	0.023 (.202)	.058				
	BMI	0.066 (.379)					
2	Intercept	-0.091(.965)	.023	0.089	19.27	.000	1341.59
	Gender	0.198(.723)	.089	(.076)			
	Age	0.025(.159)	.061				
	BMI	0.069(.336)	.278**				
	LBP	0.542(.000)**					
3	Intercept	3.182(.196)	.031	.322	25.97	.000	1278.24
	Gender	0.273(.575)	.064	(.233)			
	Age	0.018(.251)	.050				
	BMI	0.057(.368)	.219**				
	LBP	0.438(.000)**	.175**				
	PCS	0.076(.005)**	.082				
	TSK	0.054(.177)	− .370**				
	PSEQ	-0.141(.000)**					

**p < .01, *p < .05, ⁺<.10,

LBP, Low Back Pain; BMI, Body Mass Index; PCS, Pain Catastrophizing Scale; TSK, Tampa Scale for Kinesiophobia; PESQ, Pain Self Efficiency Questionnaire; RMDQ, Roland Morris Disability Questionnaire

Acute LBP group

The acute LBP group consisted of 65 participants. Table 5 presents the results. In step 1, the demographic variables were added. The hierarchical linear regression results showed that patients' demographic factors, tested in step 1, explained 1.3% of the variance in disability. There was no significant association between all demographic factors and worse disability. In step 2, we included pain intensity as the independent variable. The results of hierarchical linear regression showed that the pain intensity, tested in step 2, explained an additional 7.2% of the variance in disability. There was a

significant association between pain intensity and worse disability (ß = 0.275; p < 0.05). In step 3, psychological factors, which were TSK, PCS and PESQ, were included as the independent variables. The results of hierarchical linear regression showed that psychological factors, tested in step 3, explained an additional 14.5% of the variance in disability. Finally, those significant relations to the disability were LBP (ß = 0.320) and PSEQ (ß = −0.316). This final model explained 23.0% of the variance in patients' disability.

Table 5
Results of hierarchical linear regression analysis for acute LBP group (n = 65)

Model	Variables	Unstandardized Coefficients B (p)	Standardized Coefficients β	R^2 (ΔR^2)	ΔF	p	AIC
1	Intercept	1.067 (.822)	.086	.013	0.270	.847	382.99
	Gender	0.740 (.532)	.100				
	Age	0.029 (.461)	.062				
	BMI	0.071 (.639)					
2	Intercept	-0.865 (.853)	.039	.085 (.072)	4.696	.034	380.09
	Gender	0.340 (.770)	.061				
	Age	0.017 (.648)	.087				
	BMI	0.099 (.500)	.275				
	LBP	0.493 (.034) *					
3	Intercept	6.000 (.277)	− .018	.230 (.145)	3.576	.019	374.88
	Gender	-0.155 (.895)	.034				
	Age	0.010 (.788)	.089				
	BMI	0.102 (.469)	.320*				
	LBP	0.575 (.012) *	.210				
	PCS	0.089 (.133)	− .157				
	TSK	-0.112 (.268)	− .316*				
	PSEQ	-0.107 (.011) *					

**p < .01, *p < .05, +<.10,

LBP, Low Back Pain; BMI, Body Mass Index; PCS, Pain Catastrophizing Scale; TSK, Tampa Scale for Kinesiophobia; PESQ, Pain Self Efficiency Questionnaire; RMDQ, Roland Morris Disability Questionnaire

Subacute/chronic LBP group

The subacute/chronic LBP group consisted of 170 participants. Table 6 presents the results. In step 1, the demographic variables were added. The results of hierarchical linear regression showed that patients' demographic factors, tested in step 1, explained 11.0% of the variance in disability. All demographic factors were not statistically significant. In step 2, pain intensity was included as variables. The results of hierarchical linear regression showed that the pain intensity, tested in step 2, explained an additional 8.2% of the variance in the disability. There was a significant association between pain intensity and worse disability ($p < 0.001$). In step 3, psychological factors, which are TSK, PCS and PSEQ, were included. The results of hierarchical linear regression showed that psychological factors, tested in step 3, explained an additional 29.1% of the variance in disability. Ultimately, those that were significantly related to disability were LBP (ß = 0.183), PCS (ß = 0.183), TSK (ß = 0.139) and PSEQ (ß = −0.396). There was a significant association between all variables of psychosocial factors and disability. Of these, the PSEQ value had the most significant impact. This final model explained 38.4% of the variance in the disability of participants.

Table 6
Results of hierarchical linear regression analysis for subacute/chronic LBP group (n = 170)

Model	Variables	Unstandardized Coefficients B (p)	Standardized Coefficients β	R^2 (ΔR^2)	ΔF	p	AIC
1	Intercept	2.467 (.301)	.036	0.11	0.633	.595	984.21
	Gender	0.314 (.649)	.071				
	Age	0.019 (.365)	.064				
	BMI	0.072 (.414)					
2	Intercept	0.235 (.921)	.005	.093 (.082)	14.891	< .001	971.52
	Gender	0.042 (.950)	.093				
	Age	0.026 (.215)	.053				
	BMI	0.060 (.479)	.288				
	LBP	0.581 (< .001)					
3	Intercept	2.849 (.310)	.028	.384 (.291)	25.476	< .001	911.82
	Gender	0.247 (.656)	.054				
	Age	0.015 (.399)	.055				
	BMI	0.062 (.383)	.183**				
	LBP	0.370 (.006)**	.183*				
	PCS	0.081 (.011)*	.139*				
	TSK	0.089 (.043)*	− .396**				
	PSEQ	-0.158 (< .001)**					

**p < .01, *p < .05, [+]<.10,

LBP, Low Back Pain; BMI, Body Mass Index; PCS, Pain Catastrophizing Scale; TSK, Tampa Scale for Kinesiophobia; PESQ, Pain Self Efficiency Questionnaire; RMDQ, Roland Morris Disability Questionnaire

Discussion

In this study, how basic characteristics, pain intensity and psychosocial factors were related to disability using the hierarchical multiple regression analysis for NSLBP was systematically examined. Overall, with the addition of variables in demographic characteristics, pain intensity and psychosocial factors, the explanatory power (predictive accuracy) increased. Pain intensity had a significant effect in the acute LBP group and all psychosocial factors had a significant effect, especially the PSEQ value, in the

subacute/chronic LBP group. The results also showed that pain and PSEQ values were affected in all groups, suggesting that pain intensity and self-efficacy are key factors affecting the disability in patients with NSLBP.

In all groups, pain self-efficacy had a significant effect on disability. In [27], several other studies showed the relationship between self-efficacy and pain intensity and disability. A study on spine disorders, including LBP patients, found that low self-efficacy significantly influenced the disability of LBP and may also affect postoperative outcomes [27]. In a report on LBP subjects in Italia, more than half of the patients had low self-efficacy, and the group had a high level of disability [28]. It has been reported that pain self-efficacy is a more critical factor in the disability than fear of movement [29]. Additionally, among fear of movement, disability and pain intensity, pain self-efficacy serves as a mediator [30]. Self-efficacy was also reported to affect functional aspects such as postural stability and range of motion at the spine; the higher the self-efficacy, the greater the stability and range of motion [12]. Like other previous studies, pain self-efficacy had the most substantial effect on the disability in this study compared to several psychological factors, but especially in the subacute and chronic group. However, even in the acute phase, the impact of self-efficacy on disability is one of the new findings. To date, most of the studies have focused on chronic LBP. Pain self-efficacy has been reported to be more critical in the recovery of LBP than other psychosocial factors [31], but these participants were only for chronic LBP. Indeed, Ferrari et al. reported that self-efficacy was associated with disability and the degree of pain intensity, indicating that it is an important factor, but in the context of chronic LBP [32]. Thus, the suggestion that pain self-efficacy influences the disability for overall NSLBP, including the acute phase, is highly informative and suggests that self-efficacy is critical in implementing the management of NSLBP based on the biopsychosocial model, regardless of the duration of the disease.

Pain self-efficacy, pain, catastrophic thinking and fear of movement also influenced the disability in the subacute and chronic phases. Many psychological factors have been reported to have an impact on chronic NSCLP. Ogunlana et al. showed that those with higher PCS values have a more severe disability in catastrophic pain thinking [33]. Wertli et al. showed in their systematic review that catastrophising was a prognostic factor for LBP [13]. However, it has also been shown that the mechanism is still unclear. Besides catastrophic thoughts of pain, Leeuw et al. reported that there was an association between pain-related fear and functional impairment in CLBP patients [34]. Wertli et al. found that there was an association between fear-avoidance beliefs and LBP disability developed within six months, which is one crucial factor in chronicity [35]. These two factors are also predictors of chronicity of LBP [36]. Based on the results of previous studies and the present study, it is highly likely that these factors impact the disability for CLBP.

On the other hand, among the psychosocial factors, it was only self-efficacy that had an impact on the acute group, while fear of movement and catastrophic thoughts of pain had little impact on the disability. Pain intensity was indicated to be the most influential factor in disability for the acute group. This suggests that pain intensity itself, rather than psychosocial factors, has the most substantial impact on LBP in the acute phase. Grotle et al. reported less impact on the acute phase than in the chronic phase

regarding fear of movement [37]. In previous studies, severe pain is a factor in the transition from the acute to the chronic phase [4], so how to improve pain in the acute phase will be the key to management of preventing chronicity.

Limitations

While important findings were obtained, there are some limitations to this study. First, the sample size for the acute phase was relatively small, with only 65 participants. This was due to the stricter definition of acute LBP as being less than 4 weeks from the onset. This may somewhat reduce the precision of the results of the hierarchical multiple regression analysis. Second, subacute and chronic groups were combined. Comparing the three following groups (acute, subacute and chronic groups) might have provided more meaningful results. However, the definition of "subacute" is ambiguous, and for this study, we wanted to know the difference in the characteristics between the acute and the following groups, so this grouping was considered appropriate for this study. Despite the several limitations mentioned above, this study includes a large sample size of 255 subjects to examine the impact of functional disability in NSLBP and analyse them by the onset time with multiple psychosocial factors. This was a strong point of this study and should provide significant insights into the factors that influence the disability in NSLBP.

Clinical implication and further research

This study suggests that, regardless of the duration of the disease, pain self-efficacy has an impact and that improving pain self-efficacy from early on in the onset of LBP can improve disability. Improving pain self-efficacy means giving patients the confidence that they can manage their LBP. For this purpose, the management based on biopsychosocial models is necessary, and cognitive behavioural therapy is one of the usual methods, which is effective for CLBP [38]. Furthermore, recently, cognitive functional therapy (CFT) has been proposed [39]. CFT has been shown to improve patients' belief and self-management and to have long-term effects on disability and psychosocial factors, so it can be affected by increasing the patient's own self-efficacy [40]. Combining functional and psychological components, as in CFT, is ideal and will be an essential concept for future management of LBP. To achieve this, we first need to change the way we think about management, not only from the patient's perspective but also from physical therapists and other healthcare professionals. The reality is that many healthcare providers tend to prefer "biomedical explanations and interventions" [43]. It has also been reported that healthcare professionals have sometimes found difficulties to accurately assess the psychosocial factors of patients [45]. Therefore, healthcare professionals need to be trained to implement practices based on the biopsychosocial model to improve the self-efficacy of patients with LBP. Also, the patient may need to be trained to understand them by healthcare professionals as well.

Conclusions

In this study, the explanatory power increased with each additional variable for the disability in the order of essential characteristics, pain intensity and psychosocial factors in the overall, acute and subacute/chronic groups. Depending on the duration of the disease, the factors affecting the disability

differed, with pain having more influence than psychosocial factors in the acute phase and psychosocial factors having more influence in the chronic phase. Furthermore, the results suggest that pain self-efficacy significantly impacts all groups, including the acute phase. The result suggests the need for management based on a biopsychosocial model that enhances self-efficacy at an earlier stage. Future studies on how disability is changed by interventions based on biopsychosocial models that enhance self-efficacy and investigate the effects of the impact in more different groups may help manage NSLBP.

Declarations

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