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ORIGINAL ARTICLE

Prognostic factors for recovery from postpartum pelvic girdle pain

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Abstract Pelvic girdle pain (PGP) has a high incidence during pregnancy and in some women pain will persist for years. Most studies have used pain as the outcome measure, and little attention is given to functioning or disability. A better understanding of prognostic factors for recovery seems important for clinical care and treatment. The aim of the present paper was to identify prognostic factors for recovery from postpartum PGP and disability, and to determine the impacts of prognostic factors when pain intensity and disability are used as outcome measures. Seventy-eight women with diagnosed PGP were included 6–16 weeks postpartum. Possible prognostic factors were obtained through clinical tests and questionnaires at baseline. The clinical tests were posterior pelvic pain provocation (P4) test, active straight leg raise (ASLR) test and pain provocation of long dorsal sacroiliac ligament (LDL). One year postpartum outcome measures were obtained by Oswestry disability index (ODI ver 2.0) and worst evening pain (VAS 0–100). Multiple linear regression and logistic regression analyses were used to identify significant prognostic factors. At baseline 60% believed they would recover and 40% were uncertain or believed they would not recover. Fifty per cent had a history of low back pain (LBP), and 20% had high emotional distress (HSCL25-item $\geq$1.75). About 75% had positive LDL and P4 at both sides and 24% had pain located to all three pelvic joints. Forty per cent had ASLR scores of at least 4 (sum score range 0–10). Multivariate analyses showed consistently that ASLR and belief in improvement were statistical significant predictors for both disability and pain as outcome measures. ASLR score <4 predicted 10 points lower ODI and 19 points lower evening pain compared with having ASLR score of at least 4. Pain location was a statistical significant predictor in only one analysis. History of LBP or high psychological distress was not prognostic for recovery. ASLR test and belief in improvement are predictors of clinical significance in women having PGP postpartum.

Keywords Pelvic girdle pain · Low back pain · Clinical tests · Predictors · Active straight leg raise test · Expectancy

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Introduction

Both low back pain (LBP) and pelvic girdle pain (PGP) develop in many women during pregnancy [3, 22, 25]. In a smaller fraction, the pain persists for years after childbirth [14, 23]. Several prognostic factors have been identified for development of and recovery from LBP although no clear picture has been established [31]. According to recently published guidelines PGP can be viewed as a specific form of LBP that can occur separately or in conjunction with LBP [31]. It is thus of importance to examine prognostic factors for PGP. This might provide a better foundation to understand if and how PGP differs from LBP.

Wu and co-workers [33] reviewed the literature on associations between possible risk factors and occurrence of pregnancy-related lumbopelvic pain. They found 34

relevant studies identifying 15 possible risk factors. Strong evidence was found for strenuous work, previous LBP, and previous PGP. Two studies concluded that level and onset of pain during pregnancy were strong predictors for persistent lumbopelvic pain [20, 29]. Prepregnancy back pain and severity of complaints were also found to play a prognostic role in the study of Röst and co-workers [26], whereas a retrospective study found no association between previous back pain and PGP [25]. One study indicates that pain location might be important [1].

Studies of risk factors for persistent pain following pregnancy have identified many of the same risk factors as for development of PGP during pregnancy [6, 21, 30]. High pain intensity during pregnancy indicates a bad prognosis after pregnancy [23]. In a recent study of Gutke and co-workers [14] combined lumbar and PGP in pregnancy was a strong predictor of persistent pain 3 months postpartum. All these previous studies of persistent PGP investigated prognostic factors for those experiencing PGP in pregnancy. Although it is well known that most of these will recover within the first months following delivery [14, 23], it is unknown if the same predictors are valid for persistent PGP. It might well be that other prognostic factors will emerge when examining women that still have PGP 3 months postpartum.

Previous studies have either used clinical assessments for PGP or lumbopelvic pain as outcome measures. However, it seems important also to assess outcome in terms of self-reported functioning or disability. No previous studies have to our knowledge identified characteristics predicting long-term disability or recovery from postpartum PGP. From studies of LBP one might expect psychosocial factors and emotional distress to be of importance for recovery [5, 8, 11]. Age and socio-economic status are also possible predictors in musculoskeletal disorders [7]. Although not sufficiently validated, clinical tests are commonly used for diagnostic purposes of PGP and to discriminate between PGP and LBP. However, to what extent they are prognostic for improvement is unknown. The aims of the present study were to identify prognostic factors for recovery and improvement from PGP and disability after pregnancy, and to determine how large the impacts of prognostic factors are when pain intensity and physical disability are used as outcome measures.

Materials and methods

Subjects

Ninety-five patients were recruited by health practitioners (physicians, midwifes, nurses), following an advertisement to health professionals that gave information about the study and the requirements for participation. Inclusion criteria were PGP located distal and/or lateral to the L5–S1 area in the buttocks and/or in the symphysis, pain onset during pregnancy or within 3 weeks after delivery, most recent delivery within 6–16 weeks, willingness to participate in either of two treatment groups with informed consent, and fulfilment of the diagnostic criteria based on the following tests: posterior pelvic pain provocation (P4) test, active straight leg raise (ASLR) test, pain provocation of long dorsal sacroiliac ligament (LDL), pain provocation of the symphysis by palpation and modified Trendelenburg test. The P4 test or the ASLR test had to be positive, and at least one of the other three test results had to be positive. Exclusion criteria were back pain indicating radiculopathy, rheumatism, or other serious disease or pathology indicated by straight leg raising test, Slump test, Crams test or Femoralis nerve test. Subjects being pregnant at 1-year follow-up were also excluded. Altogether, 17 participants were excluded and 78 included. The study was approved by the regional ethics committee.

The subjects were randomized into one of two treatment programs as described in detail elsewhere [27]. The treatment period lasted 20 weeks. One group ($n = 39$) had individual physiotherapy with specific stabilizing exercises (SSEG). The other group ($n = 39$) had individual physiotherapy without specific stabilizing exercises (CG).

Measurements

At baseline the subjects completed a questionnaire including sociodemographic characteristics, pain and disability. Sociodemographic variables were age, weight, BMI, education ($<$ or $\geq$12 years), smoking status (yes or no) and parity. We also obtained self-reported history of LBP prior to last pregnancy (yes or no), emotional distress measured by the Hopkins symptom check list (HSCL25 score $<$ or $\geq$1.75) and their belief in recovery (yes—quite certainly, yes—probably, uncertain, no—probably not and no—quite certainly not). Their reported pain were classified into three groups based on pain location; (1) in the symphysis pubis only, (2) in the symphysis and one sacroiliac joint or in one or two sacroiliac joints or (3) in all three pelvic joints. The women also completed the Oswestry disability index, ver 2.0 (ODI, score 0–100), and rated their pain intensity by a VAS scale (0–100). As the pain intensity is shown to be markedly worse at the end of the day for women with postpartum PGP [16] we asked them to rate the worst evening pain as well as the worst morning pain. ODI scores and evening pain obtained at 1-year follow-up were used as outcome measures. We chose to include evening pain in our analyses as pain at the end of the day may be a more clinically relevant measure for this group of patients.

Physical assessment at baseline included ASLR, P4 and LDL tests. The ASLR test is believed to assess the ability to transfer load from the legs to the trunk [19] and to assess disease severity in patients with pregnancy-related PGP [18]. The test was performed according to the description, and impairment in raising one leg was scored on a six-point scale from 0 to 5. Scores from both sides were added to a sum score (range 0–10). The P4 test was performed to provoke pain from the sacroiliac region [24]. The LDL test provokes pain from the ligament by palpation [32]. The two last tests were performed on both sides (and scored as negative, one side positive or two sides positive). One independent investigator blind to other data performed all tests and assessments.

Statistics

Descriptive data are given as frequencies, mean and SD or median and 95% confidence interval (CI) whenever appropriate. The regression coefficients and odds ratios are reported with 95% CI. Associations between the predictors and the outcomes and between predictors were determined by Spearman rank correlations (r_s) and P values. In the multiple and logistic regressions, ODI and evening pain 1 year postpartum were the outcome variables. All included variables were assumed to be possible predictors, and thus eligible for inclusion into the multivariate analysis. In addition treatment group was added to the model. Intercorrelations between predictors were assessed from a correlation matrix.

The contributions of the variables included in each regression model were determined through manual backward stepwise linear regression. First, an analysis was carried out for each independent variable and the dependent variable to compute the crude estimates. Thereafter, all the independent variables were entered into the full model and through exclusion of the independent variables with the smallest contribution to the model (the largest P values) the best subsets of predictors were selected. The variables removed in the course, were individually re-entered for a final check of significant contribution. The final adjusted models were computed by variables with significant contributions ($P < 0.1$ used as inclusion criterion into the adjusted models).

As shown by Stuge and co-workers [27] a large number of the women reported pain and ODI values below 20 and even below 10 at the 1-year follow-up. Hence, there is a possibility that the multiple regression models will examine predictors within a small range of outcome values, and even within a range that is considered normal. We therefore also performed a logistic regression analysis with dichotomous values of ODI and evening pain as outcome. We chose to use the median value for the two outcomes to divide the cut-off values into recovered and non-recovered since these cut-off values fell well within the range of previously suggested values for discriminating between disabled and able persons [10]. The logistic regression model was built and tested along the same principles as for the multiple linear regressions. The same values were entered initially, and manual backward removal performed. SPSS (ver 15.0) were used for all statistical analyses.

Results

The 78 women ranged from 25 to 41 years in age and were included on average 10 weeks after last delivery (Table 1). Only six were regular smokers. Sixty per cent believed they would recover, 35% were uncertain and 5% had negative beliefs. Almost half of them had previous history of LBP, and 19% had high HSCL25 score ($\geq$1.75). Thirteen per cent had pain located to the symphysis only, 24% reported pain in all three pelvic joints, and 63% had pain in the symphysis and one sacroiliac joint or in one or two sacroiliac joints. More than 2/3 of the women had positive P4 or LDL at both sides. The sum score of ASLR ranged from 0 to 10 (Fig. 1) and 60% had a score of 4 or higher. For the subsequent analyses all predictors were dichotomized (see Tables 2, 3 for details).

Both ODI and evening pain improved from baseline to 1 year postpartum with median values (95% CI) decreasing from 42 (37, 44) to 18 (17, 26) for ODI and from 67 (56, 66) to 16 (21, 34) for pain ($P < 0.001$). Yet, the two variables spanned over a wide range at follow-up (Fig. 2). Pain and ODI were highly correlated 1 year postpartum (Table 2). The correlation between potential predictors and ODI or pain varied greatly (Table 2). Belief in improvement showed a highly statistically significant correlation with outcomes ($P < 0.005$), whereas HSCL25 showed a somewhat weaker correlation ($P < 0.07$). Of the three clinical tests ASLR was the only one showing a statistically significant association with outcomes. LDL, P4, pain localisation or having a history of LBP all showed weak or poor associations with ODI and pain. Moreover, P4 showed statistically significant associations with ASLR, LDL and pain localisation. Table 2 also shows that there was a strong association between treatment group and ODI or pain at follow-up.

Due to the significant associations between P4 and the other clinical tests and a poor association with the outcomes, P4 was not included in the multivariate model. The other predictors in Table 2 were included.

From the multiple linear regression analysis the variables treatment group, belief in improvement and ASLR were identified as statistically significant predictors in the final models for both ODI and evening pain as outcome

Table 1 Characteristics of the subjects at baseline ($n = 78$)

	n (%)	Mean (SD)
Age (years)		32.4 (3.7)
Weight (kg)		68 (10)
Education (years)		16.1 (2.4)
Parity (n)		1.7 (0.8)
Time since last delivery (weeks)		10 (3)
Health locus of control (score)		58 (9)
Smoking (yes)	6 (8)	
Belief in improvement		
Yes, quite sure	12 (15)	
Yes, probably	35 (45)	
Uncertain	27 (35)	
No, probably not	4 (5)	
HSCL25 (score ≥1.75)	15 (19)	
History of LBP (yes)	37 (47)	
Pain location		
Symphysis only	10 (13)	
Symphysis and one/both sacroiliac joint regions	49 (63)	
All three pelvic joints	19 (24)	
ASLR (sum ≥4)	47 (60)	
P4		
Negative	2 (3)	
Positive one side	17 (22)	
Positive both sides	59 (76)	
LDL[a]		
Negative	8 (11)	
Positive one side	13 (17)	
Positive both sides	55 (72)	

[a] $n = 76$

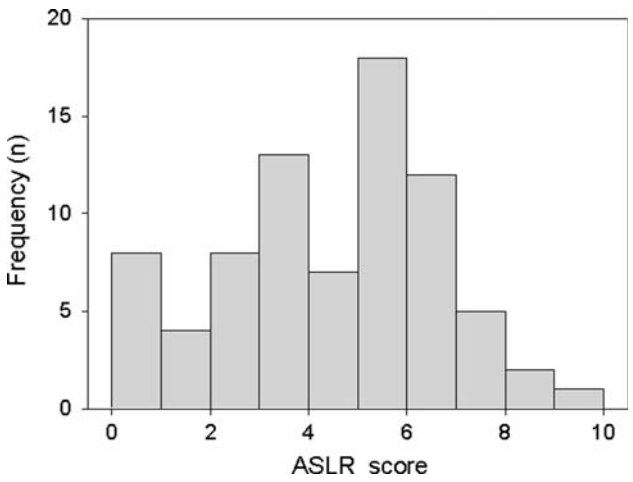

Fig. 1 Distribution of ASLR score at baseline 10 weeks postpartum. $n = 78$

(Table 3). Furthermore, pain location was a significant predictor of ODI, but was not a statistical significant predictor of evening pain ($P = 0.23$). Treatment group was the predictor with largest impact on both outcomes. The effects of ASLR and beliefs in improvement were also large, in particular for evening pain as outcome. An ASLR score of at least 4 predicted an ODI score 10 (3, 17) points higher than for those scoring <4. For evening pain, the predicted difference was 19 (7, 30). Having positive beliefs of improvement predicted a difference in ODI score of 6 (−0.8, 13) compared with those without positive beliefs. With evening pain as the outcome, the predicted difference was 12 (0.7, 24). Having pain located at all three joints predicted a difference in ODI score of 8 (−0.03, 16) compared with those with pain in only one or two joints. There were no interactions between treatment group, ASLR or beliefs in improvement ($P > 0.66$). The final model explained 43% of the variation in ODI and 35% of the variation in pain.

To perform a logistic regression analysis the subjects were categorised as recovered and non-recovered, by splitting ODI and pain at their median values (16 and 17, respectively). Crude odds ratios and the final logistic model for ODI as dependent are shown in Table 4 and for evening pain in Table 5. These analyses identified the same three predictors as identified for evening pain by the linear multiple regression as described above. The adjusted ORs were very high for the SSEG treatment group, but high ORs were found also for ASLR. The OR was 4.4 (1.1, 17.5) for recovery based on ODI scores for those having ASLR score <4 compared with those with ASLR score of at least 4. A slightly lower OR for recovery was found for those having positive beliefs about recovery. Similar results were seen with pain as the dependent variable (Table 5). There were no interactions between the predictors ($P > 0.23$).

Discussion

In addition to the effect of treatment on outcome, our results show consistently that both beliefs in relation to improvement and scores of the ASLR test are significant prognostic factors for recovery when using physical disability and pain as outcome measures. Interestingly, neither having a history of LBP nor emotional distress had any predictive power, in contrast to the common picture seen for recovery from LBP [9, 11, 28] and also reported for lumbopelvic pain postpartum [2, 26, 29].

The two outcome measures are quite different both in content and in how they are constructed. ODI assesses impairments, activity limitations and social functioning [13] whereas evening pain is rated by one visual analogue

Table 2 Bivariate correlation matrix between ODI and evening pain 1 year postpartum and potential prognostic factors

	ODI 1 year postpartum	Evening pain 1 year postpartum	Treatment group	Belief in improvement	HSCL25	History of LBP	Pain localisation	ASLR score	LDL	P4
Evening pain 1 year postpartum[h]	0.847	–								
	<0.001									
Treatment group[a]	0.570	0.455	–							
	<0.001	*<0.001*								
Belief in improvement[b]	0.320	0.341	0.236	–						
	0.004	*0.002*	*0.038*							
HSCL25[c]	0.208	0.259	0.098	0.202	–					
	0.068	*0.022*	*0.395*	*0.076*						
History of LBP[d]	0.165	0.105	0.077	0.068	0.058	–				
	0.148	*0.361*	*0.503*	*0.555*	*0.616*					
Pain location[e]	0.200	0.137	−0.030	0.088	0.254	−0.001	–			
	0.079	*0.230*	*0.795*	*0.441*	*0.025*	*0.995*				
ASLR score[f]	0.225	0.266	−0.131	0.124	0.130	0.037	0.095	–		
	0.048	*0.019*	*0.253*	*0.279*	*0.255*	*0.748*	*0.410*			
LDL[g]	0.145	0.133	0.147	−0.146	0.085	−0.078	0.153	0.043	–	
	0.211	*0.253*	*0.205*	*0.209*	*0.467*	*0.501*	*0.187*	*0.714*		
P4[g]	0.025	0.094	−0.149	−0.095	−0.026	−0.119	0.183	0.210	0.255	–
	0.826	*0.413*	*0.192*	*0.410*	*0.820*	*0.300*	*0.109*	*0.064*	*0.026*	

$n = 78$. Spearman's rho and P value (in italic)

[a] Two categories: control and SSEG

[b] Two categories: yes certain/yes probably and, uncertain/probably not

[c] Two categories: <1.75 and ≥1.75

[d] Two categories: yes and no

[e] Two categories: 1–2 joints and all three joints

[f] Two categories: sum <4 and ≥4

[g] Two categories: <2 positive and 2 positive sides

[h] Score range 0–100

scale. Yet, the results are remarkably similar in identifying predictors for recovery in the multivariate analyses. Furthermore, also the logistic regression using categorical outcomes for recovery produced the same prognostic factors. The consistency of our results, regardless of analytical approach, suggests that any methodological weakness of the outcome measures had a minor or negligible influence on our results.

Among the clinical variables the ASLR test seems to be the strongest predictor. The results show that having ASLR score of at least 4 predicts ODI score ten points higher 1 year postpartum or pain eight points higher compared with those having ASLR score <4. These effect sizes are of clinical and statistical significance [12]. When measuring the effect as odds ratios, the effect of ASLR is shown to be about 4. This rather high value underscores that the ASLR test reveals information of underlying mechanisms of importance for clinical course. Using the scoring system for the ASLR test as in the present study, it is previously shown that ASLR score can assess disease severity for patients with PGP [18]. Moreover, Mens and co-workers [19] demonstrated a relation between the ASLR test and mobility of the pelvic joints. Yet, none of these studies explains the mechanisms for how ASLR is associated to functioning or improvement. Less than 5% of healthy subjects scores one or more on the test [17], and hence our cut-off of 4 or above must reflect a marked dysfunction. ASLR is stated to reflect functioning as for instance in transfer of load from the legs to the trunk [19], indicating that the test results are related to the neuromuscular activation patterns. On the other hand, to what extent the effect is limited to the specific task and muscles involved or a more general effect is not known. In order to understand why ASLR is a strong predictor, it thus seems important to obtain more in-depth knowledge on the underlying phenomena that constitute the basis for ASLR test.

It has been claimed that pain location is an important predictor of recovery, in that <10% of those having pain in

Table 3 Multiple regression with ODI and evening pain 1 year postpartum as outcome variables

	Crude estimates			Adjusted estimates		
	β	95% CI	*P*	β	95% CI	*P*
ODI						
Treatment group[a]	20	13, 27	<0.001	20	14, 28	<0.001
Belief in improvement[b]	13	5, 21	0.003	6	−0.8, 13	0.08
HSCL25[c]	11	0.4, 22	0.04	–	–	–
History of LBP[d]	4	−5, 12	0.38	–	–	–
Pain location[e]	9	−1, 19	0.08	8	−0.03, 16	0.05
ASLR score[f]	9	0.2, 17	0.05	10	3, 17	0.005
Evening pain						
Treatment group[a]	25	13, 37	<0.001	25	13, 36	<0.001
Belief in improvement[b]	20	8, 33	0.002	12	0.7, 24	0.04
HSCL25[c]	18	2, 34	0.03	–	–	–
History of LBP[d]	4	−9, 17	0.53	–	–	–
Pain location[e]	5	−10, 21	0.49	–	–	–
ASLR score[f]	17	4, 30	0.01	19	7, 30	0.001

Unstandardized beta, 95% confidence interval and *P* value given for crude and adjusted estimates. Adjusted R^2 was 0.43 for ODI as outcome and 0.35 for evening pain as outcome. $n = 78$

[a] Two categories: control and SSEG

[b] Two categories: yes certain/yes probably and, uncertain/probably not

[c] Two categories: <1.75 and ≥1.75

[d] Two categories: yes and no

[f] Two categories: 1–2 joints and all three joints

[e] Two categories: sum <4 and ≥4

two joint regions or less had PGP 2 years after delivery compared with 21% of those with pain in all three joints [1]. This is also supported by the much stronger odds ratio for persistent pain in those being classified with both LBP and PGP in pregnancy after a thorough clinical examination [14]. In our multivariate analyses pain location in all three joints came out as a statistically significant predictor in only one of four tests. There are several differences between our study and the two previous studies that may contribute to the only partial agreement. In the studies of Albert and co-workers [1] and Gutke and co-workers [14], the same tests were used for assessment of both predictor and outcome. Furthermore, in the study by Albert and co-workers [1] multivariate analysis was not adopted. Moreover, the pain location categories and inclusion criteria were not the same in the three studies. Albert and co-workers studied a group of women that reported PGP in pregnancy, while Gutke and co-workers studied a cohort of pregnant women, including both those with and without PGP. Although all studies have measured outcome postpartum, the differences in population, reference group and analytical approach may very well explain the differences in the result related to identifying pain location as a predictor of recovery.

To our knowledge no previous study of prognosis from PGP has examined beliefs in improvement. Our results

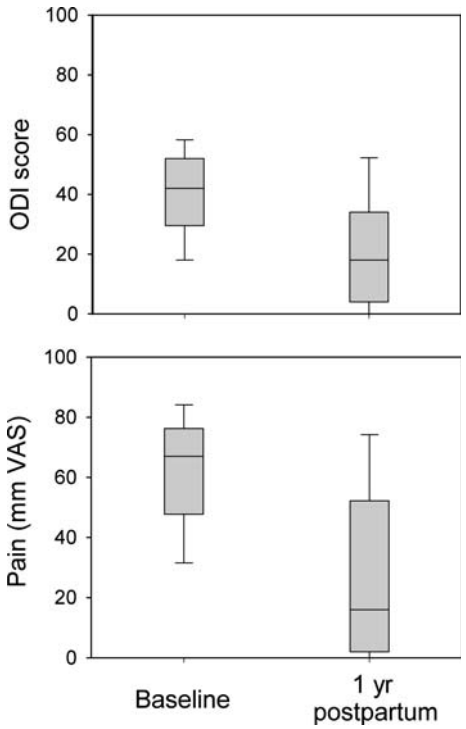

Fig. 2 Distribution of Oswestry (ODI) score and evening pain 10 weeks (*baseline*) and *1 year postpartum*. *Boxes* show interquartile range and whiskers the range. Median values given by *horizontal line*. $n = 78$. Both scales 0–100

Table 4 Odds ratios and 95% confidence intervals (CI) for recovery (based on disability) 1 year postpartum

Prognostic variables	Recovered	Not recovered	Crude		Final adjusted	
	n	*n*	OR (95% CI)	*P* value[a]	OR (95% CI)	*P* value[a]
Treatment group						
Control	8	31	1.0		1.0	
SSEG	30	9	12.9 (4.4, 37.9)	<0.001	19.8 (5.1, 77.6)	<0.001
Belief in improvement						
No/uncertain	9	22	1.0		1.0	
Yes	29	18	3.9 (1.5, 10.4)	0.006	2.9 (0.9, 9.7)	0.086
HSCL25						
≥1.75	4	11	1.0			
<1.75	34	29	3.2 (0.9, 11.2)	0.066	–	–
History of LBP						
Yes	15	22	1.0			
No	23	18	1.9 (0.8, 4.6)	0.172	–	–
Pain location						
Pain in all three joints	7	12	1.0			
Pain in 1–2 joints	31	28	1.9 (0.7, 5.5)	0.237	–	–
ASLR score						
4–10	20	27	1.0		1.0	
0–3	18	13	1.9 (0.7, 4.7)	0.182	4.4 (1.1, 17.5)	0.035

Recovery defined as ODI <17. Data for crude and final multivariate model given

Multivariate logistic regression analysis—backwards

[a] Log likelihood test

Table 5 Odds ratios and 95% confidence intervals (CI) for recovery (based on pain) 1 year postpartum

Prognostic variables	Recovered	Not recovered	Crude		Final adjusted	
	n	*n*	OR (95% CI)	*P* value[a]	OR (95% CI)	*P* value[a]
Treatment group						
Control	11	28	1.0		1.0	
SSEG	28	11	6.5 (2.4, 17.4)	<0.001	8.0 (2.5, 25.4)	<0.001
Belief in improvement						
No/uncertain	9	22	1.0		1.0	
Yes	30	17	4.3 (1.6, 11.5)	0.003	3.2 (1.1, 9.7)	0.04
HSCL25						
≥1.75	4	11	1.0			
<1.75	35	28	3.4 (1.0, 12.0)	0.05	–	–
History of LBP						
Yes	16	21	1.0			
No	23	18	1.7 (0.7, 4.1)	0.26	–	–
Pain location						
Pain in all three joints	8	11	1.0			
Pain in 1–2 joints	31	28	1.5 (0.5, 4.3)	0.43	–	–
ASLR score						
4–10	20	27	1.0		1.0	
0–3	19	12	2.1 (0.8, 5.4)	0.11	3.4 (1.1, 11.0)	0.04

Recovery defined as intensity of evening pain <16. Data for crude and final adjusted multivariate model given

Multivariate logistic regression analysis—backwards

[a] Log likelihood test

show that this factor is a strong predictor of outcome. To what extent this factor captures information regarding psychological attitudes such as optimism or aspects of coping and self-efficacy, is unknown. However, in this group of women it seems unrelated to emotional distress as measured by HSCL25, which is previously shown to be a predictor of non-recovery in acute LBP [11]. If beliefs in improvement are associated with depression or anxiety, the effects on recovery might be concealed in the multivariate analyses. Additional analyses were carried out omitting beliefs in improvement, but still HSCL25 did not appear as a significant predictor. This suggests that emotional distress, including anxiety and depression, seems unrelated to recovery in women with postpartum PGP. Unfortunately we did not measure fear-avoidance beliefs or self-efficacy, as it would have been interesting to include them in the analysis of predictors, and also to investigate their relationship to beliefs in improvement.

There is a possibility that the effect of beliefs on improvement may be stronger for the sample we have included than for the population of women with postpartum PGP. The women in the present study were included into a clinical trial including general information and ergonomic advices. Their beliefs were assessed prior to the treatment and should therefore not be influenced by it. However, to the extent that the beliefs or expectancies may partly reflect their ability to take action or to utilise support and information given [4], the fact that they took part in a specific treatment program may have contributed to a better use of such abilities for self-enhancement. If they had not been offered a treatment program, the effect of beliefs might have been different.

The present study is small with only 78 women studied. Yet, this does not seem to be the explanation for the lack of significant effect of previous LBP or emotional distress. These variables would still be far from statistically significant even if we had used a criterion of $P < 0.2$ for the final multivariate model as some authors have done previously [15]. The present study has several strong components in that treatment has been controlled for in the analyses, a blinded assessor used and there were no drop-outs. Furthermore, we have used multivariate statistics with two different outcomes and also treated the outcomes both as continuous variables and grouped into categories.

In conclusion, the study shows that ASLR test and belief in improvement are strong and independent predictors of clinical significance in women having PGP postpartum. Further studies are needed to examine these factors and how they can best be understood and used in clinical practice.

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