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Relationship between Low Back Pain, Functional Disability, and Depressive Symptoms Among Postpartum Women Following Lower Segment Caesarean Section

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Abstract

Background: Low back pain is a common musculoskeletal complaint during the postpartum period and may negatively affect physical functioning, daily activities, and psychological well-being. Women recovering following lower segment caesarean section (LSCS) may experience additional physical demands associated with maternal activities and recovery. However, the relationships among postpartum low back pain, functional disability, and depressive symptoms require further investigation.

Objective: To determine the relationships among low back pain intensity, functional disability, and depressive symptoms in postpartum women following LSCS.

Methods: A cross-sectional analytical study was conducted among 100 postpartum women aged 18–35 years who had undergone LSCS and reported non-specific low back pain 3–15 months after childbirth. Participants were recruited using purposive sampling. Low back pain intensity was assessed using the Numerical Pain Rating Scale (NPRS), functional disability was assessed using the Oswestry Disability Index (ODI), and depressive symptoms were assessed using the depression subscale of the Depression Anxiety Stress Scale-21 (DASS-21). Pearson's correlation coefficient was used to examine the relationships among the study variables. Stepwise linear regression analysis was performed to examine the association of NPRS scores with ODI and DASS-21 depression scores. Statistical significance was set at $p < 0.05$.

Results: Low back pain intensity demonstrated a moderate positive correlation with DASS-21 depression scores ($r = 0.501$, $p < 0.001$). ODI scores also demonstrated a moderate positive correlation with DASS-21 depression scores ($r = 0.514$, $p < 0.001$). A strong positive correlation was observed between NPRS and ODI scores ($r = 0.821$, $p < 0.001$). In the regression analysis, NPRS was significantly associated with ODI scores and accounted for 67.4% of the variance in ODI scores ($R^2 = 0.674$, $p < 0.001$). NPRS was also significantly associated with DASS-21 depression scores and accounted for 25.1% of their variance ($R^2 = 0.251$, $p < 0.001$).

Conclusion: Among postpartum women following LSCS, greater low back pain intensity was associated with greater functional disability and higher depressive symptom scores. These findings highlight the importance of assessing pain,

functional status, and psychological well-being as part of postpartum physiotherapy care. Because the study used a cross-sectional design, causal relationships cannot be established.

Keywords: Low back pain; postpartum; lower segment caesarean section; functional disability; depressive symptoms; Numerical Pain Rating Scale; Oswestry Disability Index; DASS-21.

INTRODUCTION

Low back pain is a common musculoskeletal complaint that may result in pain, activity limitation, and functional disability. The postpartum period is associated with substantial physical and physiological changes that may contribute to the development or persistence of low back and pelvic pain. Postpartum women may experience difficulties with mobility, self-care, household activities, and infant-care responsibilities when pain persists [1-5].

Postpartum low back pain may involve both lumbar and pelvic regions. Pregnancy-related changes in posture, body weight, centre of gravity, ligamentous laxity, and neuromuscular function may increase mechanical demands on the lumbopelvic region. Following childbirth, these demands may continue because of repeated lifting, bending, prolonged sitting, breastfeeding postures, and other activities associated with infant care [6-12].

Women who undergo lower segment caesarean section (LSCS) may experience additional physical demands during postoperative recovery. Factors associated with pregnancy, delivery, postoperative recovery, and maternal activities may contribute to continued musculoskeletal symptoms. Postural alterations, changes in body mechanics, reduced muscle function, and repetitive infant-care activities may place additional demands on the lumbar and pelvic regions [13-19].

Musculoskeletal and functional factors may contribute to persistent postpartum symptoms. Reduced abdominal and pelvic floor muscle function, altered posture, reduced physical activity, and repeated maternal-care activities may increase the demands placed on the lumbar region. Persistent pain may consequently interfere with activities of daily living and participation in maternal and household responsibilities [20-22].

Functional disability is an important consequence of persistent low back pain. Pain-related limitations may affect sitting, standing, walking, bending, lifting, self-care, and other daily activities. Previous research has demonstrated relationships between postpartum lumbopelvic pain, pain intensity, disability, and health-related quality of life [23-28].

Depressive symptoms are another important consideration in postpartum women. The postpartum period involves substantial physical, emotional, and social changes, and persistent pain and functional limitation may be associated with psychological distress. Conversely, depressive symptoms may influence pain perception, physical activity, motivation, and participation in daily activities. Therefore, assessment of both physical and psychological factors may provide a more comprehensive understanding of postpartum low back pain [29-32].

The present study therefore aimed to examine the relationships among low back pain intensity, functional disability, and depressive symptoms in postpartum women following LSCS. The Numerical Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), and depression subscale of the Depression Anxiety Stress Scale-21 (DASS-21) were used to assess the respective study variables.

AIM

To determine the relationship among low back pain intensity, functional disability, and depressive symptoms in postpartum women following lower segment caesarean section.

OBJECTIVES

1. To assess low back pain intensity among postpartum women following LSCS using the Numerical Pain Rating Scale.
2. To assess functional disability using the Oswestry Disability Index.
3. To assess depressive symptoms using the depression subscale of the Depression Anxiety Stress Scale-21.
4. To determine the relationship between low back pain intensity and depressive symptoms.
5. To determine the relationship between functional disability and depressive symptoms.

6. To determine the relationship between low back pain intensity and functional disability.
7. To examine the association of low back pain intensity with functional disability and depressive symptom scores using regression analysis

METHODOLOGY

The study was approved by the institute ethics committee, IEC- RIPT/DT/21/4511.

Study design:

Cross-sectional analytical study.

Study duration:

The study was conducted over a period of six months.

Sampling method:

Purposive sampling technique.

Sample size:

100 participants.

Study setting:

Revathi Medical Centre, Tirupur.

Inclusion criteria:

Participants were included if they:

1. Women aged 18–35 years.
2. Had undergone lower segment caesarean section.
3. Were between 3 and 15 months postpartum.
4. Women experiencing non-specific low back pain, defined as low back pain without an identifiable specific underlying spinal pathology.
5. Willing to participate and provided written informed consent.

Exclusion criteria:

Participants were excluded if they:

1. Unwilling to participate.
2. Had a previous history of low back surgery.
3. Had an underlying pathological condition such as fracture or direct trauma.

Procedure

Participants who fulfilled the eligibility criteria were recruited from the Department of Obstetrics and Gynaecology at Revathi Medical Centre, Tirupur. The purpose and procedures of the study were explained to each participant, and written informed consent was obtained before assessment.

A face-to-face assessment was conducted for each participant. Low back pain intensity was assessed using the Numerical Pain Rating Scale (NPRS), functional disability was assessed using the Oswestry Disability Index (ODI), and depressive symptoms were assessed using the depression subscale of the Depression Anxiety Stress Scale-21 (DASS-21).

The questionnaires were administered during hospital follow-up visits. All assessments were conducted using the specified outcome measures according to their respective administration procedures.

OUTCOME MEASURES

Numerical Pain Rating Scale (NPRS)

The Numerical Pain Rating Scale (NPRS) was used to assess the intensity of low back pain. Participants rated their perceived pain intensity using the numerical rating scale, with higher scores representing greater pain intensity.

Oswestry Disability Index (ODI)

The Oswestry Disability Index (ODI) was used to assess functional disability associated with low back pain. The questionnaire evaluates the impact of low back pain on functional activities and activities of daily living, with higher scores indicating greater disability.

Depression Anxiety Stress Scale-21 (DASS-21)

The Depression Anxiety Stress Scale-21 (DASS-21) was used to assess symptoms of depression, anxiety, and stress. For the present study, only the depression subscale was considered for analysis. Higher scores indicate greater severity of depressive symptoms.

DATA ANALYSIS AND RESULTS

Data was tabulated and analyzed using IBM SPSS Statistics version 24. Descriptive statistics were used to summarize the study variables. Pearson's correlation coefficient was used to determine the relationships among low back pain intensity, functional disability, and depressive symptom scores.

Stepwise linear regression analysis was performed to examine the association of NPRS scores with ODI scores and DASS-21 depression scores. Statistical significance was set at $p < 0.05$. Values reported as .000 in SPSS were presented as $p < 0.001$.

RESULTS

A total of 100 postpartum women following LSCS who fulfilled the eligibility criteria were included in the analysis.

Correlation Between Low Back Pain Intensity and Depressive Symptoms

Pearson's correlation analysis demonstrated a moderate positive correlation between low back pain intensity and DASS-21 depression scores ($r = 0.501$, $p < 0.001$). This indicates that higher low back pain intensity was associated with higher depressive symptom scores.

Correlation Between Functional Disability and Depressive Symptoms

A moderate positive correlation was observed between functional disability measured using the ODI and DASS-21 depression scores ($r = 0.514$, $p < 0.001$). This indicates that greater functional disability was associated with higher depressive symptom scores.

Correlation Between Low Back Pain Intensity and Functional Disability

A strong positive correlation was identified between low back pain intensity and functional disability, with NPRS and ODI scores showing $r = 0.821$ ($p < 0.001$). This indicates that higher pain intensity was associated with greater functional disability.

Regression Analysis with ODI as the Dependent Variable

In the stepwise linear regression analysis with ODI as the dependent variable and NPRS as the independent variable, the regression model was statistically significant ($R = 0.821$, $R^2 = 0.674$, adjusted $R^2 = 0.671$, $F = 202.475$, $p < 0.001$).

NPRS was significantly associated with ODI scores ($B = 5.460$, $SE = 0.384$, $\beta = 0.821$, $t = 14.229$, $p < 0.001$, 95% CI: 4.698–6.221). The model accounted for 67.4% of the variance in ODI scores.

Regression Analysis with DASS-21 Depression Score as the Dependent Variable

In the regression analysis with DASS-21 depression score as the dependent variable and NPRS as the independent variable, the model was statistically significant ($R = 0.501$, $R^2 = 0.251$, adjusted $R^2 = 0.243$, $F = 32.828$, $p < 0.001$).

NPRS was significantly associated with DASS-21 depression scores ($B = 1.519$, $SE = 0.265$, $\beta = 0.501$, $t = 5.730$, $p < 0.001$, 95% CI: 0.993–2.045). The model accounted for 25.1% of the variance in DASS-21 depression scores

Table 1: Pearson's Correlation Coefficient between Low Back Pain and DASS-21

		LBP	**DASS**
Pearson's correlation	LBP	1.000	0.501*
	Sig. (2-tailed)	-	.000**
	N	100	100

	DASS	0.501*	1.000
	Sig. (2-tailed)	.000*	-
	N	100	100

* Values are presented as Pearson's correlation coefficient (r). Statistical significance was set at $p < 0.05$. The correlation was positive and statistically significant

Table 2: Pearson's Correlation Coefficient between ODI and DASS-21

		ODI	DASS
Pearson's correlation	ODI	1.000	0.514*
	Sig. (2-tailed)	-	.000**
	N	100	100
	DASS	0.514*	1.000
	Sig. (2-tailed)	.000*	-
	N	100	100

* Values are presented as Pearson's correlation coefficient (r). Statistical significance was set at $p < 0.05$. The correlation was positive and statistically significant.

Table 3. Pearson's Correlation Coefficient between Pain Intensity and ODI

		PAIN	ODI
Pearson's correlation	PAIN	1.000	0.821*
	Sig. (2-tailed)	-	.000**
	N	100	100
	ODI	0.821*	1.000
	Sig. (2-tailed)	.000*	-
	N	100	100

* Values are presented as Pearson's correlation coefficient (r). Statistical significance was set at $p < 0.05$. The correlation was positive and statistically significant.

VARIABLES	r	p-value
NPRS–DASS-21	0.501	<0.001
ODI–DASS-21	0.514	<0.001
NPRS–ODI	0.821	<0.001

STEPWISE REGRESSION ANALYSIS (Dependent: ODI; Independent: NPRS)

Model	R	R Square	Adjusted R Square	Std. Error	F Change	df1	df2	Sig.
1	.821	.674	.671	8.29780	202.475	1	98	.000

Predictor: NPRS. Dependent variable: ODI.

Model	B	Std. Error	Beta	t	Sig.	Lower	Upper
Constant	3.574	2.300	—	1.554	.123	-.990	8.138
NPRS	5.460	.384	.821	14.229	.000	4.698	6.221

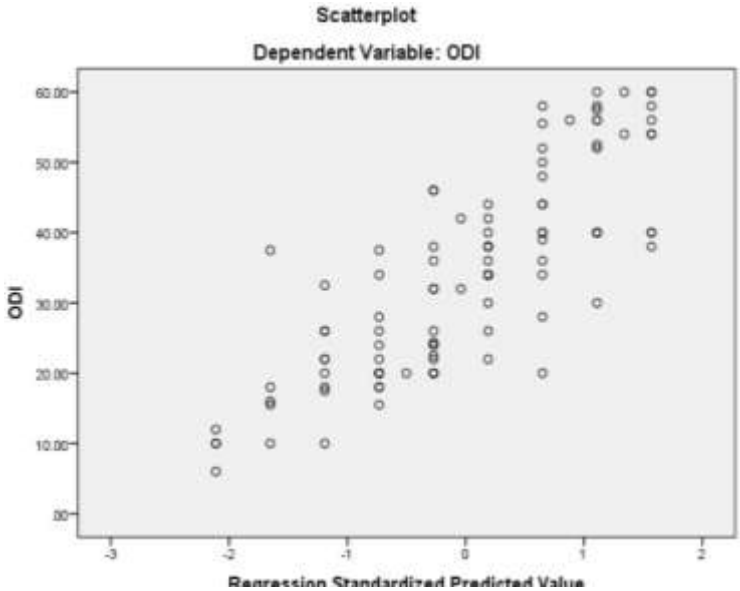


Fig 1. Scatterplot for the regression model with ODI as dependent variable.

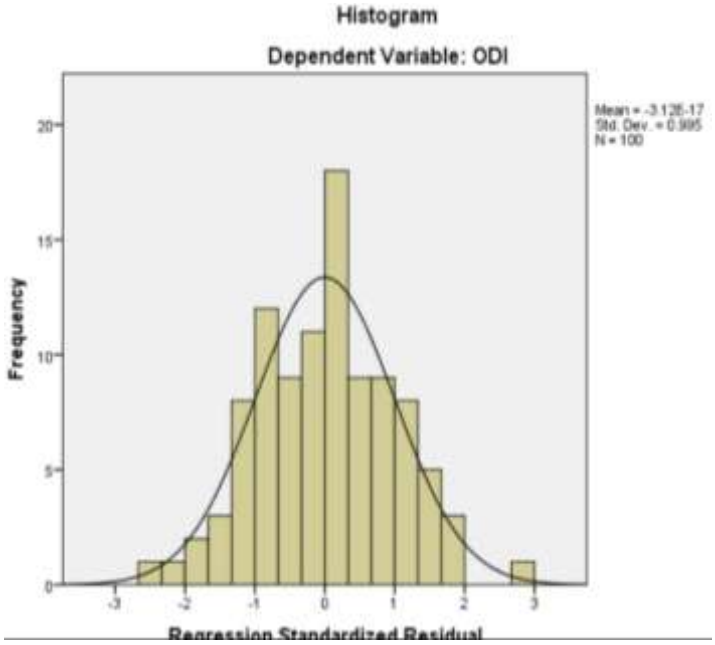


Fig 2. Histogram of standardized residuals for the ODI regression model.

STEPWISE REGRESSION ANALYSIS (Dependent: DASS-21; Independent: NPRS)

Model	R	R Square	Adjusted R Square	Std. Error	F Change	df1	df2	Sig.
1	.501	.251	.243	5.73291	32.828	1	98	.000

Predictor: NPRS. Dependent variable: DASS-21.

Model	B	Std. Error	Beta	t	Sig.	Lower	Upper
Constant	4.470	1.589	—	2.813	.006	1.316	7.623
NPRS	1.519	.265	.501	5.730	.000	.993	2.045

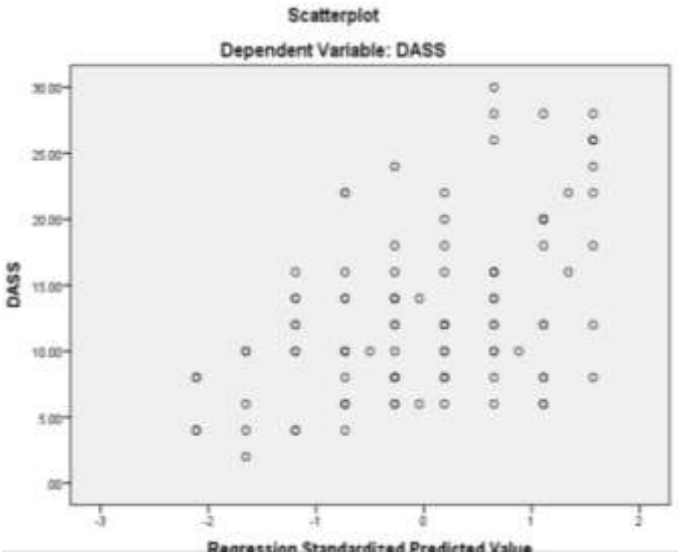


Fig 3. Scatterplot for the regression model with DASS-21 as dependent variable.

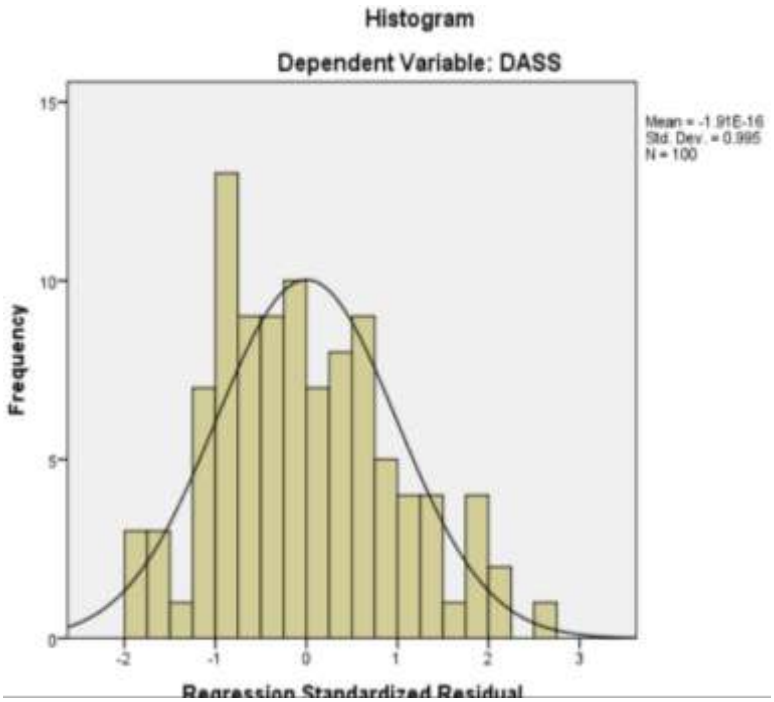


Fig 4. Histogram of standardized residuals for the DASS-21 regression model.

DISCUSSION

The present study examined the relationships among low back pain intensity, functional disability, and depressive symptoms in postpartum women following LSCS. The findings demonstrated statistically significant positive relationships among all three study variables.

A strong positive correlation was observed between low back pain intensity and functional disability, with NPRS and ODI scores showing a correlation coefficient of r = 0.821. This finding indicates that participants reporting greater low back pain intensity also reported greater functional disability. Postpartum women experiencing low back pain may have difficulty performing activities that require prolonged sitting or standing, bending, walking, lifting, and caring for their infants. Pain may therefore interfere with routine maternal and household activities.

The moderate positive correlation between low back pain intensity and DASS-21 depression scores (r = 0.501) indicates that greater pain intensity was associated with higher depressive symptom scores. Persistent postpartum pain may interfere with sleep, physical activity, independence, and participation in daily responsibilities, potentially contributing to psychological distress.

A moderate positive correlation was also found between functional disability and DASS-21 depression scores (r = 0.514). Greater functional limitation may reduce participation in daily activities and increase dependence on others. Such limitations may negatively influence confidence, motivation, and perceived well-being. At the same time, psychological distress may influence activity levels and the experience of pain, indicating that physical and psychological factors may interact during postpartum recovery.

The regression analysis demonstrated a significant association between NPRS and ODI scores. NPRS accounted for 67.4% of the variance in ODI scores in the regression model. This substantial proportion of explained variance indicates a strong statistical relationship between pain intensity and functional disability in the study population.

The regression analysis also demonstrated a significant association between NPRS and DASS-21 depression scores, with NPRS accounting for 25.1% of the variance in depressive symptom scores. This indicates that pain intensity was associated with depressive symptoms, although a substantial proportion of the variability in depressive symptoms remained unexplained by pain intensity alone. Other physical, psychological, social, and postpartum-related factors may contribute to depressive symptoms.

The findings are broadly consistent with previous literature describing relationships between postpartum lumbopelvic pain, disability, pain intensity, and depressive symptoms. Previous research has emphasized that postpartum low back and pelvic pain may have consequences for physical functioning and quality of life. The present findings further support the importance of considering both functional and psychological dimensions when assessing women with persistent postpartum low back pain.

From a physiotherapy perspective, assessment of postpartum women with low back pain should not be restricted to pain intensity alone. Functional disability and psychological well-being should also be considered. A comprehensive approach may include pain management, functional rehabilitation, restoration of lumbopelvic function, education regarding posture and infant-care activities, and appropriate referral when significant psychological symptoms are identified.

However, the cross-sectional design of the present study limits the ability to establish causal relationships. Therefore, the observed associations should not be interpreted as evidence that low back pain causes functional disability or depressive symptoms. Longitudinal and interventional studies are required to determine temporal relationships and evaluate whether targeted physiotherapy interventions can improve pain, functional outcomes, and psychological well-being in postpartum women following LSCS.

CLINICAL IMPLICATIONS

The findings suggest that postpartum women presenting with low back pain following LSCS may benefit from a multidimensional physiotherapy assessment. Assessment should consider pain intensity, functional limitations, and psychological well-being rather than focusing on pain alone. Identification of substantial functional limitation or depressive symptoms may also support timely referral to the appropriate healthcare professional

CONCLUSION

The present study demonstrated significant positive relationships among low back pain intensity, functional disability, and depressive symptoms in postpartum women following lower segment caesarean section. Greater pain intensity was strongly associated with greater functional disability and moderately associated with higher depressive symptom scores. Functional disability was also moderately associated with depressive symptoms.

These findings highlight the importance of assessing pain, functional status, and psychological well-being together in postpartum physiotherapy practice. However, because of the cross-sectional design, causal relationships cannot be established.

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INFORMED CONSENT

Written informed consent was obtained from all participants before commencement of the study. Participation was voluntary, and participants were informed about the purpose and procedures of the study. Confidentiality of participant information was maintained throughout the study.

FUNDING

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest related to this study or its publication.

AUTHOR CONTRIBUTION

Farhana Nasreen K.: Conceptualization, methodology, participant recruitment, data collection, statistical analysis, and manuscript preparation.

Dr. Santhanalakshmi: Study supervision, methodology development, critical revision of the manuscript, and final approval.

Dr. P. Bright Alwin Victor: Research guidance, manuscript review, administrative supervision, and final approval of the manuscript.

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