

Effectiveness of Physical Therapy in Managing Postpartum Musculoskeletal Pain and Urinary Incontinence: A Quasi-Experimental Study

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ABSTRACT

Background: The postpartum period is associated with major biomechanical, hormonal, and musculoskeletal adaptations that may predispose women to lumbopelvic pain, pelvic floor dysfunction, urinary symptoms, and reduced quality of life. Although physiotherapy interventions are recognized as conservative approaches for postpartum rehabilitation, their routine integration into postnatal care remains inadequate.

Aim: This study aimed to evaluate the effectiveness of physiotherapy interventions in reducing lumbopelvic pain and pelvic floor symptom bother, including urinary symptoms, while improving quality of life among postpartum women.

Methods: A quasi-experimental study design was adopted among 22 postpartum women recruited from the Department of Physiotherapy, Sree Narayana Medical Mission Hospital, Cherthala, and Indo American Hospital, Vaikom. Participants underwent a structured six-week physiotherapy intervention program consisting of pelvic floor muscle training, diaphragmatic breathing, core stabilization, pelvic tilts, walking exercises, bridging, clamshells, hip strengthening exercises, and postural correction techniques. Outcome measures included the Numerical Pain Rating Scale (NPRS) for pain assessment, the Pelvic Floor Bother Questionnaire (PFBQ) for assessment of pelvic floor symptom bother, including urinary symptoms, and the Maternal Postpartum Quality of Life Instrument (MPQOL-I) for assessment of maternal postpartum quality of life. Statistical analysis was performed using SPSS version 20. Wilcoxon signed-rank tests and paired t-tests were applied according to data normality.

Results: Statistically significant changes were observed in all outcome variables following the physiotherapy intervention. NPRS scores reduced from 7.59 ± 0.73 to 2.14 ± 1.04 ($Z = 4.14$, $p < 0.001$). PFBQ scores reduced from 23.55 ± 3.11 to 10.45 ± 2.52 ($t = 25.3$, $p < 0.001$), indicating a reduction in pelvic floor symptom bother. MPQOL-I scores increased from 55.36 ± 5.14 to 80.64 ± 7.47 ($Z = 4.11$, $p < 0.001$), indicating improved maternal postpartum quality of life.

Conclusion: The structured physiotherapy intervention was associated with significant reductions in lumbopelvic pain and pelvic floor symptom bother, along with improved maternal postpartum quality of life. The findings suggest that structured physiotherapy may be a beneficial component of postpartum rehabilitation.

Keywords: Postpartum physiotherapy, lumbopelvic pain, pelvic floor dysfunction, urinary symptoms, pelvic floor muscle training, postpartum rehabilitation, quality of life.

INTRODUCTION

Pregnancy and childbirth are associated with profound physiological, hormonal, and biomechanical changes that affect nearly every system of the female body. [1,4] These adaptations are essential for supporting foetal growth and preparing the body for labour and delivery. However, many of these changes persist during the postpartum period and contribute to a wide range of musculoskeletal and functional complications. [3]

The postpartum period, also referred to as the postnatal phase, is an important transitional stage during which women undergo recovery from pregnancy and childbirth while simultaneously adapting to motherhood and newborn care. [5] The World Health Organization (WHO) classifies the postpartum period into three overlapping stages: the acute phase lasting for the first 24 hours after childbirth, the subacute phase extending from 2 to 6 weeks postpartum, and the delayed postpartum phase continuing up to six months after delivery. [2]

During these phases, women commonly experience musculoskeletal dysfunctions including low back pain, pelvic girdle pain, stress urinary incontinence, pelvic floor weakness, abdominal muscle separation, fatigue, and postural abnormalities. [6,7] Pregnancy-related lumbopelvic pain affects approximately 45–75% of women during pregnancy and the postpartum period. [9,10] Among the most prevalent postpartum musculoskeletal disorders are lumbopelvic pain and urinary incontinence. [10] Hormonal changes, particularly increased levels of relaxin and progesterone, contribute to ligamentous laxity and joint instability, thereby increasing susceptibility to pain and

dysfunction. [4] Furthermore, the mechanical stress associated with pregnancy causes stretching and weakening of the abdominal muscles and pelvic floor musculature. [7]

Stress urinary incontinence is another major postpartum complication and is characterized by involuntary leakage of urine during activities such as coughing, sneezing, laughing, or lifting. [12] Vaginal delivery, prolonged labour, pelvic floor trauma, and neuromuscular injury contribute significantly to pelvic floor dysfunction. [7,12] Postpartum women with urinary incontinence often experience embarrassment, anxiety, social withdrawal, and reduced participation in daily activities, thereby negatively affecting overall quality of life. [15]

The concept of the “fourth trimester” has recently gained attention in maternal healthcare. [6] This term refers to the first twelve weeks following childbirth and highlights the importance of physical and emotional recovery during this period. [3,6] Despite its importance, postpartum rehabilitation remains underemphasized in many healthcare systems, particularly in developing countries. [18,19]

Physiotherapy plays a crucial role in postpartum rehabilitation by addressing musculoskeletal dysfunctions through evidence-based exercise programs and functional restoration techniques. [1,3] Pelvic floor muscle training, diaphragmatic breathing, core stabilization exercises, posture correction, stretching, and progressive strengthening exercises have demonstrated effectiveness in improving pain, continence, and physical function. [12,20,21]

Pelvic floor muscle exercises, commonly referred to as Kegel exercises, are among

the most recommended interventions for postpartum women. [14] These exercises improve pelvic support, enhance bladder control, and restore neuromuscular coordination. [12] Core stabilization exercises targeting the transversus abdominis and multifidus muscles help improve spinal stability and reduce lumbopelvic strain. [20]

Several studies have reported that postpartum exercise interventions improve physical recovery, psychological well-being, and maternal confidence. [8,13,22] Early physiotherapy interventions can reduce chronic pain, improve functional independence, and enhance overall quality of life. [3,11,13] However, despite growing evidence supporting physiotherapy in postpartum care, referral systems remain inadequate and awareness among healthcare providers and women remains limited. [18,19]

The present study was therefore conducted to evaluate the effectiveness of a structured physiotherapy intervention program in reducing lumbopelvic pain and pelvic floor symptom bother, includes urinary symptoms, and improving quality of life among postpartum women.

MATERIALS & METHODS

Study Design

The present study adopted a quasi-experimental study design to evaluate the effectiveness of physiotherapy interventions in postpartum women with lumbopelvic pain and stress urinary incontinence.

Study Setting

The study was conducted at:

1. Department of Physiotherapy, Sree Narayana Medical Mission Hospital, Cherthala.
2. Department of Physiotherapy, Indo American Hospital, Vaikom.
- 3.

Study Duration

The duration of the study was one year, and data collection was carried out from 01/10/2024 to 31/12/2024.

Sampling Procedure

A convenience sampling method was used to recruit participants who satisfied the inclusion and exclusion criteria.

Sample Size

The sample size was calculated using the formula for comparing paired mean differences in a quasi-experimental pretest–posttest study design:

$$n = (2\sigma^2(Z_{\beta} + Z_{\alpha/2})^2) / (\text{Difference}^2)$$

The confidence interval was set at 95%, with a statistical power of 80%. Based on the expected effect size derived from previous literature, the minimum required sample size was estimated to be 16 participants. Considering an anticipated dropout rate of 25%, the target sample size was increased to 30 participants. A total of 30 participants were recruited, of whom 22 completed the six-week intervention and were included in the final analysis. Eight participants did not complete the study.

Inclusion Criteria

- Women after vaginal delivery
- Age group between 20–35 years
- Lumbopelvic pain intensity greater than 4 on NPRS
- Postpartum period from the first week onward
- Presence of urinary incontinence symptoms

Exclusion Criteria

- History of caesarean section
- Postnatal bleeding complications
- Uterine prolapse
- Active infections
- Psychological abnormalities
- Musculoskeletal deformities
- Neurological and cardiac disorders
- Receiving hormone therapy

Variables

Independent Variable

- Physiotherapy exercise intervention program

Dependent Variables

- Lumbopelvic pain
- Pelvic floor symptom bother, including urinary symptoms
- Maternal postpartum quality of life

Outcome Measures

Numerical Pain Rating Scale (NPRS)

The NPRS is a one-dimensional pain assessment scale ranging from 0 to 10, where 0 indicates no pain and 10 indicates worst imaginable pain.

Pelvic Floor Bother Questionnaire (PFBQ)

The Pelvic Floor Bother Questionnaire (PFBQ) is a questionnaire used to assess the degree of bother associated with pelvic floor symptoms and dysfunction. It contains nine items scored from 0 to 5, with higher scores indicating greater pelvic floor symptom bother. In the present study, the total PFBQ score was used to assess the overall burden of pelvic floor symptoms, including urinary symptoms. Therefore, the total PFBQ score was not interpreted as a urinary-incontinence-specific measure alone. ^[16]

Maternal Postpartum Quality of Life Instrument (MPQOL-I)

The MPQOL-I is a 16-item questionnaire used to evaluate postpartum quality of life across physical, emotional, and social domains. ^[17]

Study Procedure

Twenty-two postpartum women who fulfilled the eligibility criteria participated in the study. Written informed consent was obtained before participation. Baseline assessment was conducted using Outcome measures included the Numerical Pain Rating Scale (NPRS) for pain assessment, the Pelvic Floor Bother Questionnaire (PFBQ) for assessment of pelvic floor symptom bother, including urinary symptoms, and the Maternal Postpartum Quality of Life Instrument (MPQOL-I) for assessment of maternal postpartum quality of life.

Participants underwent a six-week physiotherapy intervention program supervised by a physiotherapist. Sessions were conducted three times per week, with each session lasting approximately 30–40 minutes.

The intervention consisted of diaphragmatic breathing, pelvic floor muscle training, pelvic tilts, walking programs, bridging, transversus abdominis activation exercises, clamshells, hip strengthening exercises, quadruped exercises, calf raises, straight leg raises, and posture correction techniques.

Post-intervention assessments were performed after six weeks using the same outcome measures.

Intervention Protocol

Weeks 0–2

Goals included promoting healing, reducing pain, improving mobility, and initiating pelvic floor activation.

Exercises included:

- Diaphragmatic breathing
- Pelvic tilts
- Standing open kinetic chain exercises
- Pelvic floor contractions
- Sit-to-stand exercises

Weeks 3–4

Goals included improving pelvic floor coordination and core stabilization.

Exercises included:

- Walking program
- Transversus abdominis activation
- Bridging exercises
- Sit-to-stand exercises
- Pelvic floor contract-relax exercises

Weeks 5–6

Goals included strengthening pelvic and hip musculature and increasing functional endurance.

Exercises included:

- Walking progression
- Long-hold pelvic floor contractions
- Clamshells and reverse clamshells
- Standing march
- Hip strengthening exercises

- Fire hydrants and donkey kicks
- Calf raises
- Straight leg raises

Dosimetry

- Frequency: 3 sessions/week
- Duration: 6 weeks
- Session time: 30–40 minutes
- Intensity: Moderate intensity (RPE 11–13)

Statistical Analysis

Statistical analysis was performed using SPSS version 20. Descriptive statistics were used for demographic data analysis. The Shapiro–Wilk test assessed normality. Paired t-tests and Wilcoxon signed-rank tests were used to compare pre- and post-intervention scores.

RESULT

Descriptive Statistics – Age, Height, Weight & BMI

Table 1: Descriptive statistics of participants' demographic and anthropometric characteristics

Variables	Mean	SD	Minimum	Maximum
Age	27.64	2.26	24	32
Height	162.55	5.74	152	172
Weight	67.27	4.08	62	77
BMI	25.45	1.19	23.3	28.6

Table 1 presents the descriptive statistics of the participants' demographic and anthropometric characteristics. The mean age of the participants was 27.64 ± 2.26 years, with an age range of 24–32 years. The mean height was 162.55 ± 5.74 cm, ranging from 152 to 172 cm. The mean weight was 67.27 ± 4.08 kg, ranging from 62 to 77 kg. The mean BMI was 25.45 ± 1.19 kg/m², with values ranging from 23.3 to 28.6 kg/m².

Descriptive Statistics – Gravida and Parity

Table 2: Distribution of participants according to gravida and parity.

Variables	Frequency	Percentage
G1P1	11	50.0%
G2P1	5	22.7%
G2P2	6	27.3%

Table 2 presents the distribution of participants according to gravida and parity. Of the 22 participants, 11 (50.0%) were G1P1, 5 (22.7%) were G2P1, and 6 (27.3%) were G2P2.

Tests of Normality

Table 3: Tests of normality for outcome variables

Variables	Shapiro-Wilk test of normality		
	Statistic	Df	Sig.
NPRS	0.85	22	0.003
PFBQ	0.95	22	0.319
MPQOL	0.89	22	0.019

Table 3 presents the results of the Shapiro–Wilk test for normality of the outcome variables. NPRS ($p = 0.003$) and MPQOL-I ($p = 0.019$) showed statistically significant deviations from normality ($p < 0.05$); therefore, non-parametric analysis using the Wilcoxon signed-rank test was applied. PFBQ showed no statistically significant deviation from normality ($p = 0.319$); therefore, a paired t-test was used for pre- and post-intervention comparison.

STATISTICAL ANALYSIS OF PAIN (NPRS) USING WILCOXON SIGNED-RANK TESTS

Table 4: Descriptive statistics of NPRS scores before and after physiotherapy intervention

Test	Mean	SD	Min	Max
Pre-test	7.59	0.73	6	9
Post-test	2.14	1.04	0	4

Table 5: Wilcoxon signed-rank test comparing NPRS scores before and after physiotherapy intervention

Test	Mean	n	+ve change	-ve change	No Change	Z-value	p-value
Pre-test	7.59	22	22	0	0	4.14	$p < 0.001^*$
Post-test	2.14						

Table 5 presents the results of the Wilcoxon signed-rank test comparing NPRS scores before and after the physiotherapy intervention. All 22 participants demonstrated a reduction in NPRS scores following the intervention, with no participants showing an increase or no change in pain scores. The Wilcoxon signed-rank test demonstrated a statistically

significant difference between the pre- and post-intervention NPRS scores ($Z = 4.14$, $p < 0.001$). These findings indicate a statistically significant reduction in lumbopelvic pain following the six-week physiotherapy intervention.

Statistical Analysis of Pelvic Floor Bother (PFBQ) Using Paired t-Test

Table 6: Paired t-test comparing pre- and post-intervention PFBQ scores Mean, S.D. and t-value to compare Pre-test Post-test Pelvic floor bother (PFBQ)

Test	Mean	SD	Mean change	n	T	df	p-value
Pre-test	23.55	3.11	13.1	22	25.3	21	$p < 0.001$
Post-test	10.45	2.52					

Table 6 presents the paired t-test results comparing pre- and post-intervention PFBQ scores. The mean PFBQ score decreased from 23.55 ± 3.11 before the intervention to 10.45 ± 2.52 after the intervention, with a mean difference of 13.10. The paired t-test demonstrated a statistically significant difference between the pre- and post-intervention scores ($t = 25.3$, $df = 21$, $p < 0.001$). The reduction in PFBQ scores indicates a statistically significant decrease

in pelvic floor symptom bother following the six-week physiotherapy intervention.

Statistical Analysis of Maternal Postpartum Quality of Life (MPQoL) Using Wilcoxon Signed-Rank Tests

Table 7: Descriptive statistics of MPQOL-I scores before and after physiotherapy intervention

Test	Mean	SD	Min	Max
Pre-test	55.36	5.14	39	63
Post-test	80.64	7.47	70	92

Table 8: Wilcoxon signed-rank test comparing pre- and post-intervention MPQOL-I scores.

Test	Mean	n	+ve change	-ve change	No Change	Z-value	p-value
Pre-test	55.36	22	22	0	0	4.11	$p < 0.001^*$
Post-test	80.64						

Table 8 presents the results of the Wilcoxon signed-rank test comparing MPQOL-I scores before and after the physiotherapy intervention. All 22 participants demonstrated an increase in MPQOL-I scores following the intervention, with no participants showing a decrease or no change. The Wilcoxon signed-rank test demonstrated a statistically significant difference between the pre- and post-intervention MPQOL-I scores ($Z = 4.11$, $p <$

0.001). These findings indicate a statistically significant improvement in maternal postpartum quality of life following the six-week physiotherapy intervention.

DISCUSSION

The postpartum period is associated with substantial physical, hormonal, and emotional adjustments that may predispose women to various musculoskeletal disorders

and functional impairments^[3,6] Lumbopelvic pain and stress urinary incontinence are among the most frequently reported postpartum complications and can negatively affect maternal well-being, physical functioning, daily activities, and quality of life.^[9,10] The present study evaluated the effectiveness of a structured physiotherapy intervention program in reducing lumbopelvic pain and urinary incontinence while improving quality of life among postpartum women.

The findings of the study demonstrated statistically significant improvements in all outcome measures following the six-week physiotherapy intervention program. Pain intensity measured using the Numerical Pain Rating Scale (NPRS) showed a marked reduction from pre-intervention to post-intervention values, indicating substantial improvement in lumbopelvic pain. These findings are consistent with previous studies that reported beneficial effects of physiotherapy interventions such as pelvic stabilization exercises, diaphragmatic breathing exercises, posture correction, and core strengthening in managing postpartum musculoskeletal pain.^[10,20]

Pregnancy-related lumbopelvic pain is commonly associated with hormonal influences, ligamentous laxity, altered posture, increased lumbar lordosis, abdominal muscle weakness, and biomechanical stress imposed on the lumbar spine and pelvic girdle during pregnancy and childbirth.^[4,10] The physiotherapy interventions implemented in the present study targeted these contributing factors through exercises aimed at improving muscular support, enhancing spinal stability, correcting posture, and restoring functional movement patterns.

Core stabilization exercises formed an important component of the intervention protocol. Activation of the transversus abdominis and multifidus muscles contributes significantly to lumbopelvic stability by regulating intra-abdominal pressure and reducing mechanical stress on the lumbar spine and sacroiliac joints.

Improved neuromuscular control and enhanced pelvic stability may explain the reduction in pain observed among participants following intervention.

The present study demonstrated a statistically significant reduction in pelvic floor symptom bother, as evidenced by reduced Pelvic Floor Bother Questionnaire (PFBQ) scores following the intervention. In the present study, the PFBQ was used to assess the overall degree of bother associated with pelvic floor symptoms, including urinary symptoms. Therefore, the reduction in total PFBQ scores reflects improvement in pelvic floor symptom burden and should not be interpreted as demonstrating improvement in urinary incontinence alone. These findings are consistent with previous research demonstrating the benefits of pelvic floor muscle training in improving pelvic floor function and bladder-related symptoms.^[12,20,21]

Childbirth, particularly vaginal delivery, may result in overstretching and weakening of the pelvic floor musculature and connective tissue support structures. This may subsequently contribute to pelvic floor dysfunction and urinary symptoms during the postpartum period. Pelvic floor muscle exercises, including Kegel exercises and sustained pelvic floor contractions, may improve muscle strength, endurance, and coordination, thereby supporting continence mechanisms and pelvic floor function.

The intervention protocol additionally incorporated diaphragmatic breathing exercises, which may facilitate coordinated activation of the diaphragm, abdominal musculature, and pelvic floor muscles as part of the “core canister” mechanism. Coordinated breathing patterns assist in regulating intra-abdominal pressure and reducing excessive downward loading on pelvic structures, thereby supporting pelvic floor recovery and functional rehabilitation. Maternal postpartum quality of life demonstrated considerable improvement following physiotherapy intervention, as reflected by increased MPQOL-I scores.

Improvement in quality of life may be attributed to reductions in pain intensity and pelvic floor symptom bother, including urinary symptoms, as well as enhanced mobility, physical function, confidence, and ability to perform childcare and household activities independently. Previous studies conducted by Mahishale et al. and Khorasani et al. similarly reported improved postpartum quality of life and functional recovery following structured exercise-based rehabilitation programs. [13,20]

Participant adherence to the intervention protocol remained satisfactory throughout the study period. Supervised physiotherapy sessions may improve exercise accuracy, patient motivation, compliance, and overall rehabilitation outcomes. The structured progression of exercises from early mobility and pelvic floor activation to strengthening and endurance training may also have contributed to participant engagement and recovery.

The findings of the present study have important clinical implications for postpartum rehabilitation. Structured physiotherapy interventions may assist postpartum recovery by reducing lumbopelvic pain, decreasing pelvic floor symptom bother, and enhancing maternal quality of life. Incorporating physiotherapy rehabilitation programs into routine postpartum healthcare services may help improve functional independence and overall maternal well-being. However, larger controlled studies are required to confirm the effectiveness of these interventions.

Despite the positive findings, certain limitations should be acknowledged. The study employed a quasi-experimental design without a control group, which may limit internal validity. The sample size was relatively small, and long-term follow-up was not performed. Future studies involving randomized controlled trial designs, larger sample sizes, and extended follow-up periods are recommended to strengthen the evidence regarding postpartum physiotherapy interventions.

Nevertheless, the present study provides valuable clinical evidence supporting the effectiveness of structured physiotherapy interventions in postpartum rehabilitation. Integration of physiotherapy services into routine maternal healthcare may substantially improve postpartum recovery outcomes and enhance maternal quality of life.

CONCLUSION

The present study evaluated the association of a structured physiotherapy intervention program with changes in lumbopelvic pain, pelvic floor symptom bother, including urinary symptoms, and maternal postpartum quality of life among postpartum women.

Following the six-week physiotherapy intervention, participants demonstrated statistically significant reductions in lumbopelvic pain and pelvic floor symptom bother, along with significant improvement in maternal postpartum quality of life. The intervention program included pelvic floor muscle training, diaphragmatic breathing, core stabilization exercises, postural correction, and progressive functional strengthening exercises.

These findings suggest that structured physiotherapy may be a beneficial conservative rehabilitation approach for postpartum women experiencing lumbopelvic pain and pelvic floor symptoms, including urinary symptoms. However, as the total PFBQ score is not a urinary-incontinence-specific measure, the findings regarding urinary incontinence should be interpreted cautiously.

Future studies involving larger sample sizes, randomized controlled designs, urinary-incontinence-specific outcome measures, and long-term follow-up are recommended to further strengthen the evidence regarding postpartum physiotherapy interventions.

Declaration

Ethical Approval: The study was approved by the Institutional Ethics Committee of BCF College of Physiotherapy, Vaikom,

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