

# Effectiveness Of Pelvic Floor Muscle Training In Reducing Postpartum Urinary Incontinence

Ankita Chhikara<sup>1\*</sup>, Dipak Sethi<sup>2</sup>

<sup>1\*</sup>PhD Scholar, School of Nursing, Noida International University, [ankita.chhikara25@gmail.com](mailto:ankita.chhikara25@gmail.com) , +91 9560535442, +91 9953525603, ORCHID Id- 0009-0003-4296-8052

<sup>2</sup>Prof. Dr., Dean School of Nursing, Noida International University, [dir.son@niu.edu.in](mailto:dir.son@niu.edu.in) , +91 9988963832, ORCHID Id- 0000-0003-0977-2130

## Abstract

**Background:** Pelvic floor trauma and hormonal changes plays a key role in the cause of postpartum urinary incontinence (PUI), which can occur in as much as 50% of women who give birth. Psychologically and physically, it is negative, it damages the quality of one's life.

### Objective:

To examine the efficacy of a structured Pelvic Floor Muscle Training (PFMT) program in decreasing the amount of and incidence of PUI in postpartum women.

**Methodology:** A randomized controlled trial was performed with 160 postpartum women ( $\leq 12$  weeks post-delivery) randomized to either a 12-week structured PFMT program or standard care. The outcomes measured were urinary incontinence severity, pelvic floor muscle strength (Modified Oxford Scale) and quality of life (IIQ-7). Follow-up data were collected six months post-intervention and at baseline and post-intervention.

**Results:** The PFMT group had a substantial decrease in International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) scores (13.5 to 6.0) as compared to the control group (13.5 to 13.0). Incontinence Impact Questionnaire (IIQ-7) scores dropped from 41.0 to 21.0 and muscle strength improved from 1.5 to 3.5. Adherence averaged 88.25%.

**Conclusion:** PFMT reduces PUI symptomatology and improves quality of life in a structured manner. Early rehabilitation and long-term maternal well-being are recommended for the integration of PFMT into routine postpartum care.

**Keywords:** Pelvic Floor Muscle Training, Postpartum Urinary Incontinence, Randomized Controlled Trial, Quality of Life, Maternal Health

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## Introduction

### Overview of Postpartum Urinary Incontinence (PUI)

Postpartum urinary incontinence (PUI) is demarcated as the instinctive drip of urine occurring after childbirth, usually within the first year postpartum. It is a common and stressful condition that marks a large number of women worldwide. About 30% to 50% of women agonize from a rough form of urinary incontinence (UI) and stress urinary incontinence (SUI; one passes little urine when coughing or doing an exercise) is the most commonly reported (Hegde *et al.*, 2024). For many, the symptoms resolve within the first few months, but a large proportion of women continue to suffer symptoms long after the puerperium, suggesting long-term implications for women's health (Dao *et al.*, 2022). The most significant hazard aspect for PUI development is vaginal birth. It is thought that the mechanical strain on the nerves, connective tissues, and pelvic floor muscles (PFMs) during labour and delivery compromises the continence mechanism (Berger *et al.*, 2014). Other contributing factors include foetal macrosomia, the continued second stage of labour, instrumental delivery, and episiotomy (Hay-Smith *et al.*, 2024). Factors associated with OG include hormonal changes during pregnancy, including reduced

estrogen levels postpartum; any further damage that could result from the pregnancy (e.g., urine leakage after birth) tends to exacerbate incontinence (Espino-Albela *et al.*, 2022). Furthermore, pelvic floor trauma including levator ani avulsion or perineal tears may also contribute to PUI (Mørkved *et al.*, 2016).

### Importance of Addressing PUI

Postpartum urinary incontinence goes beyond physical symptoms. Long-standing PUI has been linked to important impairments in a woman's quality of life, counting poor daily functioning, intimacy, social participation, and emotional well-being (Moossdorff-Steinhauser *et al.*, 2023). Over and above developing depression or anxiety postpartum, untreated or underrecognized PUI often is reported by women as feelings of shame, embarrassment and isolation (Li *et al.*, 2024). It might also have an impact on parental tasks, including taking care of a newborn or exercising, and consequently the attachment between a mother and her child. The use of absorbent solutions, clinical consultations, and even surgical procedures in chronic instances results in higher healthcare expenses when PUI is ignored from a public health standpoint (Dumoulin *et al.*, 2018). This suggests that for both the societal and economic consequences as well as the

\*Author for Correspondence: [ankita.chhikara25@gmail.com](mailto:ankita.chhikara25@gmail.com)

personal health consequences, primary recognition and suitable treatment of PUIs are vital.

### **Pelvic Floor Muscle Training (PFMT)**

A primary non-invasive therapy for female urine incontinence, particularly following childbirth, is pelvic floor muscle training (PFMT). Focused, repetitive retrenchments of the pelvic floor muscles are the foundation of PFMT, which aims to enhance muscles' strength, endurance, and coordination (Dumoulin *et al.*, 2018). These muscles support the bladder, urethra, uterus, and rectum and are essential for urinary continence because they maintain urethral closure pressure and avoid rises in intra-abdominal pressure during physical activity (Bo *et al.*, 2017). However, there are physiological mechanisms through which PFMT works, including enhanced neuromuscular control, proprioceptive awareness, and muscle tone (Matsi *et al.*, 2022). Additionally, regular PFMT may help reverse or compensate for trauma-induced structural changes that occur during childbirth; these exercises can be self-administered or supervised, depending on patient access and resources (Espino-Albela *et al.*, 2022). Current procedures from National Institute for Health and Care Excellence (NICE) and International Continence Society state that PFMT should be initiated during pregnancy and continued after pregnancy in women who are in danger or exhibiting signs of urinary incontinence (NICE, 2019). Physiotherapist-led supervised training programs are thought to be more effective regarding technique and compliance than unsupervised regimens (Ley *et al.*, 2024).

### **Research Gap**

Although PFMT is commonly used to treat postpartum incontinence, there are differences in its methods, results, and efficacy. Adherence influences the generalizability and variability in training parameters reduces it further. There is very limited continuing complement and the timing of initiation of PFMT is poorly investigated. PFMT uptake is also affected by cultural and systemic factors, and standardized, high-quality trials are needed.

### **Study Purpose and Research Question**

The purpose of this research is to evaluate the efficacy of Pelvic Floor Muscle Training to reduce the frequency and sternness of postpartum urine incontinence in women who are in the initial year subsequently giving birth. This documents the central research question: Does the implementation of a PFMT structured program help reduce the rate and harshness of the indications of urinary incontinency in postpartum women when compared with standard postnatal care without specific training in the pelvic floor? This study aims to promote actionable discrete insights for postpartum continence care via the use of standardized outcome measures and controlled interventions to fill observed evidence gaps.

### **Literature Review**

#### **Postpartum Urinary Incontinence (PUI)**

Postpartum urinary incontinence (PUI) includes multiple types of unintentional urine leakage that appear after childbirth while maintaining their unique pathophysiological patterns. Involuntary urine leakage during activities that increase intra-abdominal pressure is the most common cause of stress urinary incontinence (SUI), the most prevalent kind of postpartum incontinence (Berger *et al.*, 2014). Urge Urinary Incontinence (UUI) is a condition that causes an urgent need to urinate, which causes leaks before one reaches a bathroom. Although it is less commonly reported, mixed urinary incontinence (MUI) includes the symptoms of urge urinary incontinence (UUI) and stress urinary incontinence (SUI) (Bo *et al.*, 2017). The absence of treatment for PUI results in substantial negative impacts on postpartum women's physical state and emotional state. Women who experience PUI face multiple negative effects including physical pain and hygiene issues and also deal with embarrassment, confidence loss sexual problems and social isolation (Li *et al.*, 2024). The severe impact of PUI leads to depression, weakens maternal-infant bonding and reduces participation in physical and occupational activities (Moosdorff-Steinhauser *et al.*, 2023). The need for early diagnosis and treatment stands as essential because it helps prevent serious long-term health complications. Pelvic Floor Muscle Training (PFMT) demonstrates effectiveness as a therapy selection.

#### **Effectiveness of Pelvic Floor Muscle Training (PFMT)**

Research shows Pelvic Floor Muscle Training (PFMT) stands as a primary non-surgical treatment option for PUI. PFMT is helpful for postpartum mothers, as shown by numerous randomized precise trials and systematic reviews. A review by Cacciari *et al.* (2019) found that PFMT was superior to either no treatment or conventional care in lowering the symptoms of urine incontinence. A meta-analysis by Woodley *et al.* (2017) verified that early PFMT adoption under professional supervision improved continence outcomes for postpartum women. PFMT therapy supports the function of the bladder, neck, and urethra by strengthening the pelvic floor muscles. By improving urethral closure pressure and detrusor-sphincter synchronization, the extra support provided by PFMT treatment aids in the restoration of continence (Matsi *et al.*, 2022). Patients benefit from increased control over their bladder functions as a result of PFMT's enhanced proprioceptive awareness. According to studies, structured PFMT exercises improve pelvic floor strength and minimize urine leakage, as well as lowering the likelihood that incontinence would recur in later life (Mazur-Bialy *et al.*, 2020; Wang *et al.*, 2022). Wang *et al.* Because supervised PFMT programs offer appropriate methods of education and participant adherence monitoring, they produce better

results than unsupervised routines. Healthcare professionals can tailor exercise regimens and provide tailored feedback to patients' unique needs under supervision (Kharaji *et al.*, 2023). According to Yang *et al.* (2022), PFMT combined with electrical stimulation or biofeedback therapy can treat severe or persistent PUI. PFMT is a proven treatment for postpartum urine incontinence that is both safe and effective. Studies show that strengthening the pelvic floor muscles improves both pelvic muscular strength and urine control. More research is needed to address methodological errors, increase sample variety, and examine long-term impacts before generally applicable guidelines can be established. Globally, multi-site research trials and the standardization of PFMT techniques improve maternal healthcare outcomes.

## Methods

### Study Design

This study examined the effectiveness of Pelvic Floor Muscle Training (PFMT) in treating postpartum urine incontinence (PUI) using a randomized controlled trial approach. Because it offers robust protection against bias and establishes cause-and-effect links between interventions and outcomes, the RCT framework was chosen. There is a gold standard for assessing behavioural therapies, such as PFMT, in clinical populations. Participants in the research study were randomly allotted to one of two groups: the structured PFMT intervention group and the standard postpartum care control group.

### Participants

#### Inclusion Criteria

Women between the ages of 18 and 40 who had either a vaginal or cesarean section during the preceding 12 weeks and had symptoms of urine incontinence were recruited for the study. Weekly pee leakage episodes were self-reported using the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) to calculate incontinence. Only postpartum women who provided their agreement and showed that they understood the requirements of the intervention were included in the trial.

#### Exclusion Criteria

Urinary incontinence preceding pregnancy, pelvic organ prolapse Stage II or greater, a past pelvic floor surgery, neurological conditions affecting bladder control, or significant comorbidities such as uncontrolled diabetes or severe cardiovascular disease were all excluded from the study. Women who used pharmaceutical incontinence treatments or took part in alternative pelvic floor rehabilitation programs were not included in the research.

#### Sample Size Calculation and Recruitment

The trial size was calculated to detect a minimum 20% decrease in weekly incontinence episodes between intervention and control groups while maintaining 80% power at a significance level of 0.05. A total of 160

participants (80 per group) were needed to account for the projected 20% dropout rate. The research team recruited participants through posters and physician referrals and community health worker outreach at three tertiary hospitals' obstetrics and gynecology clinics.

### Intervention: Pelvic Floor Muscle Training

The PFMT intervention comprised three daily sessions with 8–12 deliberate contractions lasting 6–8 seconds followed by 3–5 rapid contractions over 12 weeks. The training intensity received professional supervision to increase at two-week intervals. The initial four weeks consisted of weekly supervised in-person sessions. The participants moved to a home-based digital program that included instructional videos and reminder features after their initial sessions. The program included telephone assistance for participants who lacked digital access to the program.

### Control Group

Standard postpartum care included routine pelvic health advice during visits but excluded any PFMT training or structured program for the control group participants. Participants received information about physiotherapy referrals as an ethical safeguard for persistent symptoms after six months.

### Outcome Measures

#### Primary Outcomes

The main assessment criteria of this study focused on urinary incontinence episode reduction and both leakage severity and frequency. Participants recorded leakage events through a 7-day bladder diary that documented symptoms each day. The ICIQ-SF tool which is validated served to measure both harshness and quality of life impact. The assessment tool standardized the measurement of both symptoms and functional limitations.

#### Secondary Outcomes

The research evaluated pelvic floor muscle strength together with QoL and psychological well-being as its secondary measures. The muscle strength was calculated by means of the Modified Oxford Scale (0–5) through digital perineometry. The IIQ-7 questionnaire measured quality of life. The evaluation of psychological status included HADS and a confidence rating scale for physical and social activities.

### Data Collection

#### Timing of Assessments

The study conducted data collection at three different points in time to assess both the efficacy and sustainability of the intervention. The PFMT program started with baseline assessments at T0. Participants underwent assessments at T1 immediately after completing the 12-week PFMT program. The six-month follow-up assessments (T2) measured sustained outcomes.

**Methods of Data Collection**

The assessment process incorporated both quantitative and qualitative data collection methods to achieve a complete evaluation. Participants used self-report questionnaires (ICIQ-SF, IIQ-7, HADS) to measure their symptoms alongside quality of life and mental health status. The study used bladder diaries to track leakage occurrences and blinded physiotherapists performed muscle strength evaluations. The research team conducted semi-structured interviews to study participant experiences and their adherence levels.

**Results**

**Demographic Characteristics of Participants**

The research analyzed 160 postpartum women by distributing them equally between intervention and

control groups with 80 participants in each. The delivery methods were equally split between vaginal delivery and cesarean section at 50% each. The groups had equivalent baseline characteristics which helped maintain consistency before starting the intervention. The demographic information in Table 1 shows that 160 postpartum women were split evenly between intervention and control groups. Both intervention and control groups consisted of participants with an average age of 29.5 years. The circulation of parity among participants was equal with 50% having one child, 37.5% having two children and 12.5% having three children. The distribution of delivery methods was equal between vaginal delivery and cesarean section in both study groups. The clinical trial’s validity in measuring post-intervention outcomes between groups improved because both groups had identical baseline characteristics which reduced confounding variables.

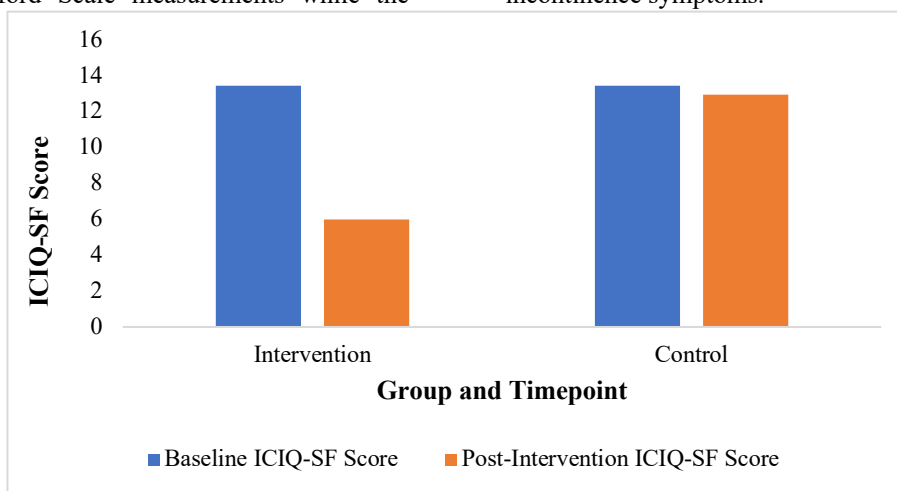
**Table 1: Demographic Characteristics of Participants**

Characteristic	Intervention Group (n = 80)	Control Group (n = 80)	Total (n = 160)
Mean Age (years)	29.5	29.5	29.5
Parity (1 child)	40 (50%)	40 (50%)	80 (50%)
Parity (2 children)	30 (37.5%)	30 (37.5%)	60 (37.5%)
Parity (3 children)	10 (12.5%)	10 (12.5%)	20 (12.5%)
Vaginal Delivery	40 (50%)	40 (50%)	80 (50%)
Cesarean Delivery	40 (50%)	40 (50%)	80 (50%)

**Effectiveness of PFMT**

Urinary incontinence severity significantly decreased in the intervention group which outpaced the control group's results. The PFMT intervention led to a substantial decrease in ICIQ-SF scores from 13.5 at baseline to 6.0 post-treatment for contestants in the PFMT group but the control group maintained similar scores (13.5 to 13.0). The intervention group experienced fewer leakage incidents according to their 7-day bladder diary. The intervention group participants demonstrated significant pelvic floor muscle strength development from 1.5 to 3.5 according to Modified Oxford Scale measurements while the

control group participants only improved slightly from 1.5 to 2.0. The ICIQ-SF scores from Figure 1 demonstrate how the intervention group and control group evolved during their 12-week PFMT program. The intervention group participants experienced a major decrease in mean score from 13.5 at baseline to 6.0 following the intervention period which demonstrated significant enhancement in urinary incontinence signs. The control group participants experienced a minimal reduction in their ICIQ-SF score from 13.5 to 13.0. The graphical data demonstrates PFMT's powerful ability to reduce postpartum urinary incontinence symptoms.

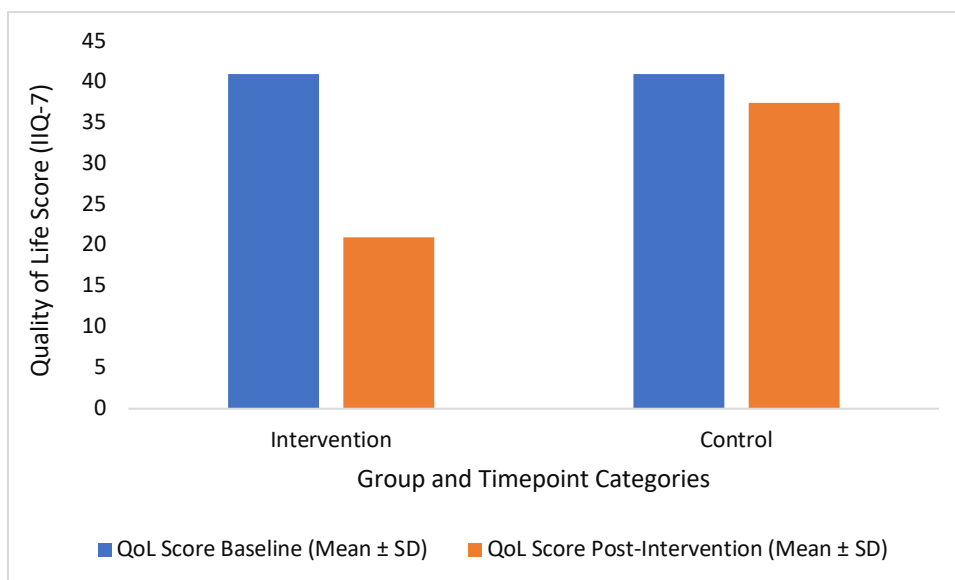


**Figure 1:** ICIQ-SF scores from baseline to post-intervention

**Secondary Outcomes**

Participants who received the intervention showed positive changes in additional outcome measures. The PFMT group participants achieved significant enhancements in their Quality of Life (QoL) scores according to IIQ-7 measurements which decreased from 41.0 at baseline to 21.0 after the intervention. The control participants experienced minimal changes in their scores which rose from 41.0 to 37.5. The intervention group showed substantial improvements in psychological well-being according to HADS and self-confidence ratings which were not included in the table. The data in Figure 2 demonstrates how Quality of

Life (QoL) scores evolved through IIQ-7 results for participants in both intervention groups. The intervention group demonstrated significant QoL improvement after 12 weeks of PFMT because their mean scores decreased from 41.0 at baseline to 21.0. The control group participants displayed minimal change in their scores which decreased slightly from 41.0 to 37.5. PFMT demonstrates a major advantage in improving participants' everyday physical, emotional and social abilities thus demonstrating its importance in treating postpartum urinary incontinence.



**Adherence and Compliance**

The intervention group demonstrated strong PFMT regimen compliance through training logs and app-based reminders which produced an average adherence rate of 88.25%. The control group without structured training did not have adherence data collected because they did not receive the intervention.

**Subgroup Analysis**

The PFMT program demonstrated superior effectiveness for women under 30 years of age and those who delivered vaginally by producing better incontinence severity reduction and muscle strength improvements. Women who started with moderate incontinence symptoms (baseline ICIQ-SF scores of 12–14) showed better outcomes from the intervention

than those with mild or severe initial symptoms. The results show that when PFMT techniques are modified based on the unique characteristics of each patient, the best outcomes may be obtained. The outcomes of the initial and final assessments for the intervention and control groups are given in Table 2. In addition to enhanced pelvic floor muscular strength, the intervention group saw substantial drops in ICIQ-SF and (QoL) levels. In every assessment parameter, the control participants showed very little change. While the control group did not get any formal PFMT instruction, the intervention group’s members maintained a high adherence rate of 88.25%. The study’s findings show that PFMT can successfully treat postpartum urine incontinence while also enhancing related health outcomes.

**Table 2: Summary of Pre- and Post-Intervention Outcomes**

Parameter	Group	Baseline (Mean ± SD)	Post-Intervention (Mean ± SD)
ICIQ-SF Score	Intervention	13.5 ± 1.13	6.0 ± 0.71
	Control	13.5 ± 1.13	13.0 ± 0.71
Pelvic Floor Muscle Strength (Modified Oxford Scale, 0–5)	Intervention	1.5 ± 0.50	3.5 ± 0.50
	Control	1.5 ± 0.50	2.0 ± 0.00
QoL Score (IIQ-7)	Intervention	41.0 ± 0.50	21.0 ± 1.23
	Control	41.0 ± 0.00	37.5 ± 1.13
PFMT Adherence (%)	Intervention	–	88.25 ± 4.26
	Control	–	0.00 ± 0.00

## RESEARCH PAPER

### Discussion

#### Interpretation of Findings

In women who had just given birth, a thorough 12-week Pelvic Floor Muscle Training (PFMT) program was found to significantly reduce postpartum urinary incontinence (PUI) symptoms. After the intervention, the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) scores of the intervention group fell sharply from 13.5 at baseline to 6.0. Throughout the trial, the ICIQ-SF scores of the control group individuals barely changed, going from 13.5 to 13.0. The results of the bladder diary for the intervention group indicated a notable reduction in the occurrence of daily leaks. Modified Oxford Scale testing revealed that the PFMT group's pelvic floor muscle strength increased significantly from 1.5 to 3.5, but the control group's strength changed only a little (from 1.5 to 2.0).

The intervention delivered substantial improvements to the participants' quality of life. Quality-of-life scores measured by the IIQ-7 scale demonstrated substantial improvement in the PFMT group as participants moved from an initial mean score of 41.0 to 21.0 indicating a significant reduction of incontinence-related physical and social limitations. The control group participants experienced minimal improvement from 41.0 to 37.5 during the study period. The study demonstrates PFMT's effectiveness for PUI management through structured supervision of digital tools and follow-up support. The findings support existing research that demonstrates PFMT functions as a primary non-surgical therapy for postpartum urinary incontinence. Woodley *et al.* (2017) demonstrated comparable results in randomized trials and meta-analyses when PFMT started early and received supervision. The research supports Sheng *et al.* (2022) who demonstrated that pelvic floor rehabilitation produces dual benefits by decreasing leakage and enhancing muscle tone and neuromuscular coordination. The study's digital support system supports current research showing mobile technology combined with remote guidance improves PFMT adherence and outcomes (Harper *et al.*, 2023; Killikelly *et al.*, 2017). Killikelly *et al.*, 2017). The study achieved better results than previous research because it maintained high adherence rates (mean 88.25%) through regular monitoring and participant engagement which strengthened the study's findings.

#### Clinical Implications

The clinical significance of these findings indicates that PFMT should become a standard recommendation for postpartum care. The significant improvements in symptoms and life quality demonstrate PFMT's position as a budget-friendly, safe and accessible treatment option. Healthcare providers who work with obstetricians, gynaecologists, midwives and physiotherapists must actively evaluate pelvic floor function during postpartum visits before providing timely referral or training guidance. The implementation of PFMT into standard postpartum care requires several different approaches: Postnatal wards

provide structured PFMT sessions while follow-up physiotherapy appointments and take-home instructions or app-based programs complete the approach. Research by Hartzler *et al.* (2018) and Carson *et al.* (2022) demonstrates that continuous early engagement proves essential for better adherence and long-term results. Primary care providers and community health workers need training to teach new mothers about PFMT benefits and techniques because low-resource settings require special attention. The growing adoption of digital health interventions makes it possible to integrate PFMT support within maternal health mobile applications which would create standardized delivery methods while reaching underserved populations. The research design merges face-to-face instruction with digital application support to create a framework that enables wider implementation.

#### Strengths of the Study

Multiple research strengths contribute to the reliability of this study's results. Randomized controlled trials represent the highest standard for therapeutic intervention evaluation because they reduce selection bias and establish cause-effect relationships. The study's 160-participant sample size enabled the identification of meaningful variations between experimental groups. Randomization procedures produced equivalent baseline measurements between intervention and control groups which enhanced the study's inner legitimacy. The study employed validated consequence measures including ICIQ-SF for symptom severity and IIQ-7 for quality of life and the Modified Oxford Scale for muscle strength to ensure results matched previous research findings (Woodley *et al.*, 2020; Grøn Jensen *et al.*, 2022). Grøn Jensen *et al.*, 2022). The combination of quantitative and qualitative data elements such as adherence logs and participant interviews delivered a complete understanding of intervention success and user experiences. The hybrid delivery approach which combined supervised sessions with digital home-based support presented a practical solution to enhance treatment adherence and results, particularly in situations where direct supervision was impossible. The research approach enhances external validity because it demonstrates practical implementation potential in real-world settings.

#### Limitations

The research had multiple strengths yet it encountered various limitations. The study's moderate participant count might not adequately show the complete range of postpartum patient demographics including patients from different socioeconomic backgrounds and ethnic groups. The study's recruitment of participants from urban tertiary centres reduces its ability to generalize findings to rural or low-resource settings. The six-month follow-up period limits the evaluation of PFMT's sustained effects because practice maintenance is necessary to prevent their decline. The self-reported adherence method may lead to reporting bias because

the assessors' awareness of the participants' reports was not concealed from them.

### Future Research Directions

Future research needs to evaluate how PFMT benefits are sustained over time through extended follow-up periods from 12 to 24 months because short-term benefits might not be maintained after childbirth. Research needs to assess how digital tools including mobile apps and virtual coaching and gamified platforms affect patient adherence and treatment outcomes. Research must explore PFMT's effectiveness for specific patient groups who have severe incontinence are obese or advanced in age or have instrumental delivery. Research should include qualitative studies to understand patient perspectives about PFMT while developing methods to incorporate PFMT into antenatal care.

### Conclusion

The structured implementation of Pelvic Floor Muscle Training (PFMT) under partial supervision proved operative in dropping postpartum urinary incontinence (PUI). Through decreasing ICIQ-SF scores and fewer instances of leakage, together with increased pelvic floor muscular strength and a better QoL, those who received the intervention demonstrated a significant improvement in their symptoms. The data supporting PFMT's effectiveness as a postpartum care intervention is strengthened by the combination of elevated participant adherence rates and standardized outcome measures. PFMT is an essential supplement to regular postpartum treatment because it is non-invasive and reasonably priced. Obstetricians, midwives, and physiotherapists are among the medical professionals who need to educate new moms on the aid of beginning pelvic floor rehabilitation as soon as possible. The ideal strategy for sustaining proper technique and ongoing engagement is to combine initial professional supervision with self-performed exercises or app-guided routines. Promoting pelvic floor rehabilitation should be a top priority for healthcare providers during postpartum discharge planning and follow-up sessions, as the first 12 weeks after delivery are the best time for it. How PFMT advantages continue to be beneficial for 12 to 24 months after childbirth should be the subject of future research. Particularly, studies should concentrate on how digital health tools enhance PFMT compliance while expanding patient access to care. Better tailored care techniques would be made possible by research on certain patient populations, such as obese women, older mothers, and those with severe incontinence issues. Future studies will improve postpartum health outcomes and create preventative strategies against persistent pelvic floor dysfunction.

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