

Easing the Ache After Birth: A Quasi-Experimental Study on the Effectiveness of Kegel Exercises on After-Pain Among Postnatal Mothers in Rural South India

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Abstract: Background: The days immediately after childbirth are rarely as peaceful as new mothers expect. As the uterus works to shrink back to its pre-pregnancy size, many women experience 'after-pains'- cramping contractions that can be as uncomfortable as early labour. Kegel exercises, developed to strengthen the pelvic floor, have been proposed as a simple, low-cost way to ease this discomfort and support uterine involution, yet they remain under-used in routine postnatal care in many parts of India. Objectives: To assess pre- and post-intervention after-pain scores among postnatal mothers, determine the effectiveness of a structured Kegel exercise protocol in reducing after-pain, and examine whether selected demographic variables were associated with baseline pain levels. Methods: A quasi-experimental, two-group pretest-posttest design was used at St. Mary's Community Health Centre, H. D. Kote, Mysuru. Forty postnatal mothers (20 experimental, 20 control) who had undergone normal vaginal delivery were enrolled through non-probability purposive sampling. The experimental group performed Kegel exercises three times daily for three days; the control group received routine postnatal care alone. After-pain was measured using an 11-point Numerical Pain Rating Scale on Day 1, Day 2, and Day 3. Results: Mean pain scores in the exercise group fell from 8.25 (SD 0.64) on Day 1 to 5.75 (SD 0.79) on Day 2 and 3.80 (SD 0.89) on Day 3. Friedman's ANOVA confirmed a significant reduction across the three days ($\chi^2 = 40.00, p < 0.001$), and Wilcoxon signed-rank tests showed every pairwise comparison (Day 1 vs 2, Day 1 vs 3, Day 2 vs 3) was significant ($p < 0.001$). Baseline pain was not associated with maternal age or gestational age ($p > 0.05$), though a modest positive correlation between gestational age and pain score emerged by Day 2 and Day 3. Conclusion: A brief, nurse-taught Kegel exercise protocol produced a clinically meaningful and statistically significant reduction in after-pain among postnatal mothers. Given its negligible cost and simplicity, Kegel exercise deserves a routine place in postnatal nursing care, particularly in low-resource community settings.

Keywords: Kegel exercise; after-pain; postnatal mothers; uterine involution; pelvic floor muscle training; numerical pain rating scale

1. Introduction

Childbirth is often described as one of life's most transformative events, but the story rarely ends when the baby is delivered. What follows- the puerperium, or postnatal period- is its own physiological journey, one that healthcare providers sometimes underestimate in the rush of celebrating a safe delivery. Labour pain is expected and even, in its way, purposeful, signalling the progress of birth^[1]. Far less anticipated by many new mothers is what comes next: the cramping, spasmodic discomfort known as after-pain, caused by the very contractions that help the uterus return to its pre-pregnancy size and location^[1,2].

The postnatal period, sometimes called the 'fourth trimester,' typically spans the six to eight weeks during which the physiological changes of pregnancy reverse course^[2]. During this window, a woman's body is not only healing but adjusting to the demands of a newborn, often with little rest and less attention paid to her own recovery. A growing body of evidence recognises that postnatal exercise- including pelvic floor training- can ease this transition, improving cardiovascular fitness, supporting weight regulation, and reducing the risk of long-term complications such as stress urinary incontinence^[3,4].

Kegel exercises, popularised by Dr. Arnold Kegel in 1948, involve the repeated, deliberate contraction and relaxation of the pelvic floor muscles^[5]. Originally developed to manage urinary incontinence, they have since been studied for a wider range of postpartum benefits- reduced perineal laxity, better bladder control, and, of particular interest to this study, faster uterine involution and reduced after-pain^[5,6]. The mechanism is intuitively appealing: strengthening the muscular support around the uterus and pelvic organs may help the uterus contract more efficiently and comfortably as it shrinks.

Despite this, postnatal exercise remains something of a blind spot in maternal care, particularly in rural India, where far more attention is paid to antenatal preparation than to recovery after birth. Global estimates suggest that 65–85% of people do not meet recommended physical activity levels^[7], and postnatal women are no exception. In India, an estimated 14.6% of postpartum mothers report urinary incontinence and 59% experience some form of postpartum depression within six to eight weeks of delivery; in Karnataka specifically, community surveys have found urinary incontinence in roughly 0.5% of rural women and uterine prolapse in 3.4%^[8]. Meanwhile, the World Health Organization has previously estimated a global maternal mortality ratio of around 400 per 100,000 live births in settings with inadequate postnatal care^[8]- a sobering

reminder that the postnatal period, though often treated as an afterthought, carries real risk when neglected.

It was against this backdrop- a rural community health centre where antenatal counselling was thorough but postnatal exercise was rarely discussed- that the present study was conceived. The researchers, all nursing students completing their clinical training, observed that mothers were rarely taught Kegel exercises despite their simplicity, safety, and negligible cost. This study set out to test, systematically, whether a short structured Kegel exercise protocol could meaningfully reduce after-pain in the earliest days after a normal vaginal delivery.

1.1 Objectives

- 1) To assess the pre-test and post-test level of after-pain among postnatal mothers in the experimental and control groups.
- 2) To determine the effectiveness of Kegel exercise on after-pain among postnatal mothers in the experimental and control groups.
- 3) To find the association between the pre-test level of after-pain and selected demographic variables of postnatal mothers.

1.2 Hypotheses

H1: There will be a significant difference between the mean pre-test and post-test after-pain scores among postnatal mothers in the experimental group.

H2: There will be a significant association between the pre-test level of after-pain and selected demographic variables of postnatal mothers.

Both hypotheses were tested at the 0.05 level of significance.

2. Review of Literature

The literature on after-pain is, first and foremost, a reminder of how common and under-discussed this problem is. In a large descriptive study of postnatal women in the United States, between 50% and 80% reported some degree of after-pain discomfort, with 10–18% describing it as severe- most often multiparous women^[15]. Similar patterns emerged in a Brazilian sample, where the majority of postpartum women attending physical therapy for pain relief showed normal uterine involution but still reported moderate pain on standard visual scales^[16]. In a UK-based correlation study, roughly a quarter of postnatal women specifically reported after-birth pains, alongside back pain and headache^[18], while another London-based study found that 96% of breastfeeding mothers experienced deep pain in the lower abdomen, back, or breast, with pain intensity rising alongside parity^[19]. A large prospective cohort of over a thousand women found severe after-pains in just over half the sample, frequently accompanied by nervousness, irritability, and disrupted sleep^[20]- a useful reminder that after-pain is rarely just a physical complaint.

A second strand of research has tested what nursing and physiotherapy interventions can do about it. An evaluative study in Chennai found that simple nursing measures- lying prone, emptying the bladder, and gentle massage- produced a highly significant reduction in after-pain scores^[17]. Positioning itself has been studied directly: in one experimental comparison, 95% of postnatal mothers preferred the prone position over supine, with meaningfully greater pain relief when applied within 24- 72 hours of delivery^[23], a finding echoed in a separate trial evaluating prone positioning alone^[27].

Kegel exercise specifically has accumulated a smaller but consistent evidence base. An early study of verbal instruction alone found measurable changes in urethral pressure during pelvic floor contraction, underscoring that even brief teaching can produce a physiological effect^[22]. A hospital-based randomised controlled trial in India enrolling 290 postnatal mothers found that structured Kegel instruction significantly improved perineal laxity compared with routine care alone^[13], while a quasi-experimental study on urinary elimination problems found Kegel exercise significantly reduced pain and incontinence-related outcomes over four weeks ($p = 0.002-0.00025$)^[24]. Closer to the present setting, a Rajasthan-based quasi-experimental study combining Kegel exercise with prone positioning reported a highly significant reduction in after-pain ($t = 15.12$, $p < 0.001$) and improved uterine involution ($t = 9.54$, $p = 0.001$)^[26], and a pelvic floor muscle training programme followed over a year found meaningful cure or improvement rates for postpartum incontinence in the majority of participants^[25]. Most recently, a 2024 hospital-based study in Kanpur directly compared Kegel exercise with prone positioning among primiparous postnatal mothers and likewise found significant benefit for after-pain reduction and involution^[28].

Taken together, this literature supports two conclusions that shaped the present study. First, after-pain is a genuine, often underappreciated source of postnatal distress rather than a trivial complaint to be waited out. Second, Kegel exercise- cheap, safe, and requiring no equipment- has a plausible and repeatedly demonstrated effect on both after-pain and uterine involution, yet remains inconsistently taught in routine postnatal nursing care, particularly in rural and community settings such as the one studied here.

2.1 Conceptual Framework

This study was guided by the General System Theory originally proposed by Ludwig von Bertalanffy (1968) and later adapted for nursing by J. W. Kenny, conceptualised as an open system model^[30]. Within this framework, the postnatal mother is viewed as a system continuously exchanging input, throughput, and output with her environment. The **input** comprised each mother's baseline characteristics- age, parity, education, residence, dietary pattern, and episiotomy status- together with her pre-test after-pain score. The **throughput** was the Kegel exercise intervention itself, administered to the experimental group while the control group received routine postnatal care. The **output** was the resulting change in after-pain score, and the **feedback** loop was represented by the statistical comparison

between expected and observed pain reduction- in essence, the effectiveness of the intervention.

3. Materials and Methods

3.1 Design and Setting

A quasi-experimental, two-group pretest–posttest design was adopted, conducted in the postnatal unit of St. Mary's Community Health Centre Trust, H. D. Kote, Mysuru, Karnataka. This setting- a community-based, rural health facility- was chosen precisely because postnatal exercise education was observed to be inconsistently delivered there, making it a realistic test bed for a low-cost nursing intervention.

3.2 Population, Sample, and Sampling

A total of 40 postnatal mothers who had undergone normal vaginal delivery were enrolled using non-probability purposive sampling and allocated to an experimental group (n = 20) and a control group (n = 20), each assessed within 24 hours of delivery.

Inclusion criteria: mothers following normal vaginal delivery, aged 18–35 years, willing to participate, available throughout the study period, and able to communicate in Kannada, English, Hindi, or Malayalam.

Exclusion criteria: mothers delivered by caesarean section; those with high-risk complications such as postpartum haemorrhage, eclampsia, placenta accreta, shock, pulmonary embolism, uterine prolapse, puerperal sepsis, or multiple pregnancy; those unavailable during the study period; and those younger than 18 or older than 35 years.

3.3 Instruments

Data were collected using a two-part tool developed by the investigators following a review of relevant literature. Section A recorded demographic and obstetric variables (age, gravida, occupation, education, residence, episiotomy status, and dietary pattern). Section B was an 11-point (0–10) Numerical Pain Rating Scale, adapted from McCaffery and Beebe's patient instructions, in which each mother rated her current, best, and worst after-pain over the preceding 24 hours; the average of the three ratings represented her pain level for that day. For descriptive interpretation, scores were grouped as no pain (0), mild (1–4), moderate (5–6), and severe (7–10). Content validity of the demographic proforma was established with five nursing experts, all of whom reached full agreement after minor modifications. A pilot study conducted on four postnatal mothers in early May 2024 confirmed the feasibility of the procedure and tool.

3.4 Intervention

Mothers in the experimental group performed a five-step Kegel exercise protocol three times daily for three consecutive days, beginning on Day 1 after delivery: (1) sit, stand, or lie with the knees slightly apart and the bladder empty; (2) inhale gently and slowly tighten the pelvic floor muscles, beginning around the anus; (3) tighten around the

vagina; (4) squeeze and lift both areas as firmly as comfortable; and (5) hold for 5–10 seconds before exhaling and relaxing. The control group received routine postnatal ward care without structured pelvic floor instruction.

3.5 Data Collection and Ethical Considerations

Institutional ethical clearance and administrative permission were obtained prior to data collection. Each participant received a clear explanation of the study's purpose and procedures, and written informed consent was obtained on Day 1. Demographic data and baseline pain scores were recorded on Day 1, the intervention was administered over three days, and pain was reassessed each morning and evening, with the Day 3 score serving as the post-test measure. Each assessment took approximately five minutes per participant; the full data collection period spanned three days per participant.

3.6 Statistical Analysis

Descriptive statistics (frequency, percentage, mean, and standard deviation) summarised demographic and pain-score data. The Shapiro–Wilk test assessed normality of the pain-score distributions. Given non-normal distributions, Friedman's ANOVA compared pain scores across the three days, and the Wilcoxon signed-rank test performed pairwise comparisons between days. Spearman's correlation coefficient examined the relationship between age, gestational age, and pain scores, and the likelihood ratio test examined associations between Day 1 pain level and demographic characteristics. A p-value below 0.05 was considered statistically significant throughout.

4. Results

Results are presented for the experimental group (n = 20), which received the Kegel exercise intervention and repeated pain assessment across three days.

Table 1: Demographic and obstetric characteristics of the experimental group (n = 20)

Characteristic	Category	n	%
Age (years)	20–24	13	65
	25–29	7	35
Gestational age (weeks)	< 38	2	10
	≥ 38	18	90

Participants' age ranged from 20 to 28 years (mean 23.85, SD 2.18) and gestational age from 37 to 39 weeks (mean 38.55, SD 0.69); the majority were aged 20–24 years and had a gestational age of 38 weeks or more.

Table 2: Postnatal after-pain scale scores over three days

Day	Range	Mean	SD	Median	IQR
Day 1	7–9	8.25	0.64	8	8–9
Day 2	4–7	5.75	0.79	6	5–6
Day 3	2–5	3.8	0.89	4	3–5

The Shapiro–Wilk test indicated that pain scores did not follow a normal distribution on any of the three days ($p < 0.05$ in each case), supporting the use of non-parametric methods for subsequent comparisons.

Table 3: Friedman's ANOVA and pairwise Wilcoxon signed-rank comparisons

Comparison	Test statistic	p-value
Day 1 vs Day 2 vs Day 3 (Friedman's ANOVA)	$\chi^2 = 40.00$	$< 0.001^*$
Day 1 vs Day 2 (Wilcoxon)	$Z = -4.028$	$< 0.001^*$
Day 1 vs Day 3 (Wilcoxon)	$Z = -4.041$	$< 0.001^*$
Day 2 vs Day 3 (Wilcoxon)	$Z = -4.008$	$< 0.001^*$

Friedman's ANOVA confirmed a statistically significant reduction in after-pain scores across the three days ($p < 0.001$). Every pairwise comparison- Day 1 versus Day 2, Day 1 versus Day 3, and Day 2 versus Day 3- was also significant ($p < 0.001$), indicating that pain relief continued to accrue with each additional day of Kegel exercise rather than plateauing after a single session.

Table 4: Correlation between age, gestational age, and after-pain score

Day	Variable	Spearman's r	p-value
Day 1	Age	-0.13	0.585
	Gestational age	0.405	0.076
Day 2	Age	-0.15	0.528
	Gestational age	0.457	0.043*
Day 3	Age	-0.081	0.734
	Gestational age	0.508	0.022*

Maternal age showed a weak, non-significant negative correlation with after-pain score on all three days. Gestational age showed a positive correlation that strengthened over time, reaching statistical significance on Day 2 ($r = 0.457$, $p = 0.043$) and Day 3 ($r = 0.508$, $p = 0.022$) — mothers with a slightly longer gestation tended to report marginally higher pain scores later in the observation period, though the association remained modest in magnitude.

A likelihood ratio test examining the association between Day 1 pain level (dichotomised at the median) and demographic characteristics (age group and gestational age category) found no statistically significant association (age group: $LR = 1.84$, $p = 0.175$; gestational age: $LR = 2.51$, $p = 0.113$), indicating that baseline after-pain severity was not meaningfully explained by these demographic factors alone.

5. Discussion

The headline finding of this study is a simple and encouraging one: mothers who performed a brief, nurse-taught Kegel exercise protocol experienced a substantial, statistically robust decline in after-pain over just three days, from a mean of 8.25 - solidly in the severe range- down to 3.80, at the boundary of mild-to-moderate pain. This pattern echoes earlier work from Chennai, where structured nursing interventions produced a highly significant drop in after-pain scores^[17], and aligns closely with a Rajasthan-based study that combined Kegel exercise with prone positioning and likewise reported highly significant reductions in both pain and time to uterine involution^[26]. It is also consistent with a hospital-based randomised trial that found Kegel instruction meaningfully improved postpartum perineal laxity compared with routine care^[13], and with a four-week Kegel programme

that produced significant improvement across multiple urinary and pain-related outcomes^[24].

The steady, day-on-day decline observed here- rather than a single sharp drop - is worth dwelling on. It suggests that the benefit of Kegel exercise in this context may be cumulative: each session appears to add to the relief achieved the day before, rather than a ceiling effect being reached after the first exposure. For nursing practice, this argues against treating a single bedside demonstration as sufficient; sustained reinforcement across the early postnatal days appears to matter.

The relationship between gestational age and pain trajectory is a more nuanced finding. Mothers who had carried slightly longer gestations tended to report marginally higher pain by Day 2 and Day 3, even though this relationship was absent on Day 1. One plausible explanation is that a larger, more mature uterus at term requires more vigorous contraction to achieve involution, producing pain that becomes more apparent as the initial post-delivery numbness and adrenaline of labour recede. This finding should be interpreted cautiously, however, given the modest sample size and the exploratory nature of the correlation analysis; it merits confirmation in a larger cohort before it is treated as clinically actionable.

The absence of a significant association between baseline pain and either age or gestational age is, if anything, reassuring from a practical standpoint: it suggests that Kegel exercise need not be selectively targeted at particular demographic subgroups but can reasonably be offered to postnatal mothers as a general practice, regardless of these baseline characteristics.

5.1 Limitations

The study's conclusions should be read alongside several limitations. The sample was drawn from a single community health centre using non-probability purposive sampling, which limits generalisability to other populations and settings. The sample size (20 per group) was modest, restricting statistical power, particularly for the demographic association and correlation analyses. Pain was measured exclusively through patient self-report, which- while a well-validated and clinically appropriate approach- is inherently subjective and cannot be corroborated with objective physiological markers of uterine involution such as fundal height. The intervention window was brief (three days), and no longer-term follow-up was conducted to determine whether the observed benefits persisted or whether the exercise habit continued after discharge. Finally, the study was restricted to mothers who had undergone normal vaginal delivery; mothers delivered by caesarean section, who experience a different pain profile, were excluded and warrant separate investigation.

6. Conclusion

This study adds a modest but useful data point to a growing body of evidence: Kegel exercise, taught simply and reinforced over just three days, produced a significant and clinically meaningful reduction in after-pain among

postnatal mothers following normal vaginal delivery. Given that the intervention requires no equipment, no medication, and only a few minutes of nursing time to teach, the cost-to-benefit ratio is difficult to argue with. For nurses and midwives working in resource-constrained, community-based settings such as the one studied here, Kegel exercise represents a rare intervention that is simultaneously free, safe, and evidence-supported. The findings argue for its routine inclusion- not as an optional add-on, but as a standard component- of postnatal nursing care.

6.1 Implications for Nursing

- **Nursing practice:** Kegel exercise should be taught proactively to all eligible postnatal mothers as part of routine bedside care, with repeated reinforcement over the first several postnatal days rather than a single instruction.
- **Nursing education:** Curricula should ensure that postnatal exercise, including pelvic floor training, receives attention proportionate to that given to antenatal preparation.
- **Nursing administration:** Ward protocols and postnatal care checklists in community health centres could formally incorporate a Kegel exercise teaching step, ensuring the practice does not depend on individual staff initiative.
- **Nursing research:** Larger, multi-site trials — including mothers delivered by caesarean section and longer follow-up periods- are needed to confirm these findings and to clarify the unexpected relationship between gestational age and later pain scores observed here.

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