ISSN: 2347-6567

International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR |Vol. 14 | Issue 3| Jul - Sep 2026

www.ijamscr.com

DOI : https://doi.org/10.61096/ijamscr.v14.iss3.2026.1517.1526

The Effect of Relaxation and Fitness Massage on Postpartum Recovery in Mothers after Childbirth

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Published on: 10.09.2026
Published by: Futuristic Publications

Abstract: The postpartum period, the six weeks after delivery of the placenta, is when the pelvic organs and other body systems return to their pre-pregnancy condition; without adequate care, mothers can develop long-term weakness in the abdomen, lower back, and pelvic floor. Postpartum massage is applied inconsistently across therapists, with no standardized protocol, so its benefit for recovery remains unclear. This study aimed to determine the effect of relaxation and fitness massage on postpartum recovery after childbirth. A quasi-experimental, pretest-posttest control group design was conducted in Klaten Regency, Central Java, Indonesia. By accidental sampling, 34 postpartum mothers received six massage sessions (intervention group) and 24 received none (control group); data were analyzed with frequency distribution, the Wilcoxon signed-rank test, and the Mann-Whitney U test. In the intervention group, uterine involution, striae, lochia color, perineal wound healing, abdominal, back, thigh, and calf pain, and breast-milk flow improved significantly from visit one to visit six ($p<0.01$), while the control group showed little change ($p>0.01$). At visit six the intervention group differed significantly from the control group ($p<0.01$; $p<0.05$ for striae and abdominal pain). Relaxation and fitness massage significantly accelerates postpartum recovery and can be recommended as a complementary intervention for postpartum mothers.

Keywords: *massage; relaxation; fitness; postpartum recovery; postpartum mothers.*

Introduction

Traditional and complementary health services are delivered by traditional health practitioners as part of promotive, preventive, curative, and rehabilitative efforts, and in Indonesia they must follow established professional, service, and operational-procedure standards (Ministry of Health of the Republic of Indonesia, 2017). Massage is one such complementary service: the manipulation of soft tissue and muscle using the hands, arms, and fingers to support the body's natural healing process (PaP3i, 2018). A substantial and growing body of research supports its physiological benefits. Field's (2016) review of three decades of massage-therapy trials reported reduced pain, anxiety and depression scores, and, in some populations, influential immune changes such as increased natural-killer-cell activity, across conditions ranging from prenatal depression to autoimmune disease. However, a large quantitative review of massage's effect on cortisol found the between-group effect size to be small and often not statistically distinguishable from zero, suggesting that massage's clinical benefits are unlikely to be driven by cortisol reduction alone and may instead involve local circulatory and mechanical pathways (Moyer et al., 2011).

In modern clinical culture, maternal health after childbirth is often overshadowed by attention to the newborn's growth and development, whereas many traditional cultures regard the postpartum mother's own recovery as essential, since her wellbeing underlies both infant feeding and the emotional foundation of the new family (Dennis et al., 2007). The postpartum period is defined as the six-week interval following delivery of the placenta, during which the pelvic organs and most of the anatomical and physiological changes of pregnancy and childbirth return toward their pre-pregnancy state; many of these changes occur within the first 10-14 days, a window that also carries risk of infection at the open placental site and of continued blood loss (Lopez-Gonzalez & Kopparapu, 2022; Chauhan & Tadi, 2022). Recovery depends on the mother's baseline fitness, her medical condition before, during, and after pregnancy, and her mode of delivery, so its pace varies considerably between women; uterine involution may take about four weeks, other systems ten to twelve weeks, and musculoskeletal changes the longest of all, so that without adequate care a mother can develop long-term weakness in the abdomen, lower back, and pelvic floor (Chauhan & Tadi, 2022).

Several recent trials indicate that manual therapy can measurably speed specific components of this recovery. Effleurage massage delivered on the first postpartum day has been shown to reduce the intensity of uterine-involution (afterpains) pain in quasi-experimental and comparative studies conducted at Indonesian primary care facilities (Herlina & Handayani, 2023). A systematic review of 30 randomized trials on complementary approaches to postpartum pain concluded that massage reduced pain after caesarean birth in the first 24 hours and at seven days postpartum, and that herbal ointments reduced perineal pain after episiotomy, although the overall quality of evidence remained very low and further high-quality trials were called for (Smith et al., 2022). A broader systematic review of complementary therapies across pregnancy, childbirth, and the postpartum period likewise found that massage, aromatherapy, and electroacupuncture produced significant benefits for post-caesarean pain management (Lima-De-La-Iglesia et al., 2024). For lactation, oxytocin-stimulating back massage delivered over the thoracic vertebrae has repeatedly been shown to increase breast-milk volume and ease of expression in postpartum mothers (Faiza et al., 2023; Lismidiati et al., 2022). For perineal-wound recovery, reviews of non-pharmacological postnatal perineal care report that adjunctive physical therapies, including infrared and massage-based approaches, can support pain relief and wound restoration alongside standard hygiene and suturing care (Girsang & Elfira, 2023; El-Lassy & Madian, 2018).

Despite this accumulating evidence, most existing studies test a single massage technique against a single, narrowly defined outcome - effleurage against afterpains pain alone, or oxytocin massage against milk volume alone - typically using a one-group pretest-posttest design without a comparison group, which cannot rule out the natural course of postpartum recovery as an alternative explanation for the observed improvement (Herlina & Handayani, 2023; Faiza et al., 2023). Reviewers examining this literature have explicitly noted the shortage of well-controlled trials and the very low overall quality of evidence for complementary approaches to postpartum recovery, and have called for further high-quality trials (Smith et al., 2022). At the same time, the way postpartum massage is actually delivered in the field varies considerably between therapists - in which side of the body is massaged first, which combination of techniques is used, and for how long - so no standardized, evidence-based protocol for comprehensive postpartum recovery massage currently exists (PaP3i, 2018).

This study addresses that gap by evaluating a single, standardized relaxation and fitness massage protocol - combining effleurage, petrissage, and friction techniques in six structured sessions - against a genuine, no-massage control group, and by tracking its effect across nine distinct anatomical and physiological indicators of postpartum recovery simultaneously (uterine fundal height, abdominal striae, lochia color, perineal-wound healing, abdominal pain, lower-back pain, thigh pain, calf pain, and breast-milk flow) rather than a single outcome in isolation. This multi-indicator, controlled design allows the overall physiological impact of a combined-technique massage protocol on postpartum recovery to be assessed as a whole, providing evidence toward a standardized operational protocol that has been lacking in the traditional-massage literature. Specifically, this

study aimed (1) to determine the effect of relaxation and fitness massage on postpartum recovery in mothers after childbirth, and (2) to describe a model of relaxation and fitness massage that can be used for postpartum recovery in mothers after childbirth.

Research Method

Design, Setting, and Ethical Approval

This study used a quantitative approach with a quasi-experimental, pretest-posttest with control group design. The research was conducted in Klaten Regency, Central Java Province, Indonesia, an area served by 26 primary health centers and, according to district statistics for that year, home to 185,184 women of reproductive age and an average of 12,781 deliveries per year (Badan Pusat Statistik Kabupaten Klaten, 2022). A non-equivalent (non-randomized) control group was used because random allocation of postpartum mothers presenting for routine care was not operationally feasible within the primary health center setting; group assignment instead followed the health facility catchment area in which each mother received postnatal care. The research protocol received ethical clearance from the institutional research ethics committee prior to data collection, and written informed consent was obtained from every respondent after the purpose and procedure of the study had been explained.

Participants and Sampling

Respondents were recruited by accidental (convenience) sampling among postpartum mothers attending routine postnatal care in the study area during the data-collection period. Inclusion criteria were: a normal (spontaneous vaginal) delivery, singleton pregnancy, first postnatal visit within the first three days after delivery, willingness to participate for six consecutive massage/observation sessions, and absence of major obstetric complications (e.g., postpartum hemorrhage, severe pre-eclampsia/eclampsia, or puerperal infection at enrolment). Mothers with a caesarean delivery, a known bleeding disorder, or a dermatological condition contraindicating massage were excluded. A total of 58 postpartum mothers met the criteria and agreed to participate: 34 were enrolled in the intervention group and 24 in the control group.

Intervention Protocol

The intervention group received six sessions of relaxation and fitness massage, one session at each of six scheduled postnatal home or health-center visits spanning the first six weeks postpartum, delivered by trained midwife-therapists who had completed traditional-massage competency training consistent with national standards (PaP3i, 2018). Each session combined three manual techniques applied in sequence to the back, abdomen, and lower limbs: (1) effleurage, a slow, rhythmic gliding stroke performed with the palms and fingers in the direction of venous and lymphatic return, used to open each session and to transition between body regions; (2) petrissage, a kneading and gentle squeezing of muscle tissue between the fingers and thumb, applied to the calves, thighs, and lower back to relieve muscular tension; and (3) friction, small circular or transverse pressure applied with the fingertips or thumb over localized areas of tension, used on the lower back and perineal-adjacent region to promote local circulation. Each session lasted approximately 30-45 minutes and followed a fixed body-region sequence (back, then abdomen, then lower limbs) to standardize delivery across therapists. The control group received routine postnatal care from the primary health center without any massage intervention.

Outcome Measures and Data Collection

Data were collected through direct clinical observation and structured interview at the first visit (pretest, before the first massage session or, for the control group, at the equivalent first postnatal visit) and again at the sixth visit (posttest, after six massage sessions or the equivalent elapsed time for the control group). Nine postpartum recovery indicators were assessed using a structured observation sheet: uterine fundal height (palpated and classified relative to the umbilicus and symphysis pubis, as a proxy for uterine involution), abdominal striae (visually graded as none, faint, clear, or very clear), lochia color (classified as red, reddish-brown, yellowish-brown, or yellowish/clear, reflecting the rubra-serosa-alba sequence), perineal-wound condition (classified as moist/unhealed, dry, or healed), abdominal pain, lower-back pain, thigh pain, and calf pain (each self-reported by the mother and classified as none, occasional, or frequent), and breast-milk flow (observed/reported as oozing, dripping, or spurting). All instruments and classification criteria were identical for both groups and were applied by the same trained data collectors to minimize measurement bias.

Data Analysis

Data were analyzed descriptively using frequency distribution to summarize respondent characteristics and the pattern of change in each recovery indicator between the first and sixth visits. Because all nine outcome indicators were measured on ordinal or categorical scales rather than continuous, interval-level scales, non-parametric statistical tests were used for inferential analysis. The Wilcoxon signed-rank test was used to examine within-group differences between the first and sixth visits, applied separately to the intervention and the control group. The Mann-Whitney U test was then used to compare the intervention and control groups at the first visit and again at the sixth visit, in order to determine whether the massage protocol produced a difference in postpartum recovery beyond that attributable to the natural course of recovery under routine care alone. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant, with $p<0.01$ additionally reported to indicate a higher level of confidence for the primary comparisons.

RESULTS AND DISCUSSION

Respondent Characteristics

Table 1 presents the age distribution of respondents in both groups. Most respondents in both groups were aged 20-35 years - the period generally regarded as the safest reproductive age range for pregnancy and childbirth - accounting for 30 of 34 mothers (88.2%) in the intervention group and 20 of 24 mothers (83.3%) in the control group. The age composition of the two groups was broadly comparable, supporting their use as a valid basis for pre-post comparison.

Table 1. Age Distribution of Respondents in the Intervention and Control Groups

Age Group	Intervention (n=34)	%	Control (n=24)	%	Total (n=58)	%
<20 years	1	2.9	0	0.0	1	1.7
20-35 years	30	88.2	20	83.3	50	86.2
>35 years	3	8.8	4	16.7	7	12.1

Postpartum Recovery Indicators Before and After Massage

Table 2 summarize the descriptive change in each of the nine recovery indicators, in the intervention and control groups respectively, between the first visit (before massage) and the sixth visit (after six massage sessions). In the intervention group, all indicators shifted markedly toward a normal postpartum state: uterine fundal height became non-palpable in 28 of 34 mothers (82.4%) by the sixth visit, compared with only 1 mother (2.9%) at the first visit; lochia progressed from predominantly red/reddish-brown toward yellowish/clear in 28 mothers (82.4%) by the sixth visit; perineal wounds were fully healed in 26 mothers (76.5%), compared with none at the first visit; abdominal pain resolved completely in 33 mothers (97.1%); and breast-milk flow changed from oozing/dripping to a strong, spurting flow in 28 mothers (82.4%). The control group also showed some improvement over the same six-visit interval, consistent with the natural course of postpartum healing, but the shift was consistently smaller: for example, uterine fundal height became non-palpable in 21 of 24 mothers (87.5%, comparable proportion but starting from a less advanced baseline), perineal wounds healed completely in 18 mothers (75.0%), and abdominal pain resolved in 14 mothers (58.3%), a considerably smaller improvement than the 97.1% seen in the intervention group.

Table 2. Distribution of Postpartum Recovery Indicators in the Intervention and Control Group Visit 1 (Pretest) vs. Visit 6 (Posttest)

Indicator	Category	Intervention Group		Control Group	
		Visit 1 (%)	Visit 6 (%)	Visit 1 (%)	Visit 6 (%)
Uterine fundal height	Above umbilicus	1 (2.9)	-	3 (12.5)	-
	Level with umbilicus	3 (8.8)	-	14 (58.3)	-

	3 fingers below umbilicus	11 (32.4)	1 (2.9)	3 (12.5)	1 (4.2)
	Midway umbilicus-symphysis	12 (35.3)	-	2 (8.3)	-
	3 fingers above symphysis	6 (17.6)	5 (14.7)	2 (8.3)	2 (8.3)
	Not palpable	1 (2.9)	28 (82.4)	-	21 (87.5)
Abdominal striae	None	7 (20.6)	11 (32.4)	2 (8.3)	4 (16.7)
	Faint	19 (55.9)	20 (58.8)	15 (62.5)	11 (45.8)
	Clear	5 (14.7)	2 (5.9)	6 (25.0)	9 (37.5)
	Very clear	3 (8.8)	1 (2.9)	1 (4.2)	-
Lochia color	Red	19 (55.9)	-	16 (66.7)	-
	Reddish-brown	14 (41.2)	6 (17.6)	4 (16.7)	5 (20.8)
	Yellowish-brown	1 (2.9)	8 (23.5)	3 (12.5)	6 (25.0)
	Yellowish / clear	-	20 (58.8)	1 (4.2)	13 (54.2)
Perineal wound	Moist/unhealed	17 (50.0)	-	17 (70.8)	-
	Dry	14 (41.2)	8 (23.5)	7 (29.2)	6 (25.0)
	Healed	3 (8.8)	26 (76.5)	-	18 (75.0)
Abdominal pain	None	13 (38.2)	33 (97.1)	8 (33.3)	14 (58.3)
	Occasional	19 (55.9)	1 (2.9)	14 (58.3)	10 (41.7)
	Frequent	2 (5.9)	-	2 (8.3)	-
Lower-back pain	None	10 (29.4)	29 (85.3)	6 (25.0)	8 (33.3)
	Occasional	19 (55.9)	4 (11.8)	13 (54.2)	12 (50.0)
	Frequent	5 (14.7)	1 (2.9)	5 (20.8)	4 (16.7)
Thigh pain	None	16 (47.1)	31 (91.2)	10 (41.7)	14 (58.3)
	Occasional	14 (41.2)	3 (8.8)	10 (41.7)	8 (33.3)
	Frequent	4 (11.8)	-	4 (16.7)	2 (8.4)
Calf pain	None	16 (47.1)	31 (91.2)	12 (50.0)	11 (45.8)
	Occasional	15 (44.1)	3 (8.8)	9 (37.5)	12 (50.0)
	Frequent	3 (8.8)	-	3 (12.5)	1 (4.2)
Breast-milk flow	Oozing	19 (55.9)	3 (8.8)	14 (58.3)	1 (4.2)
	Dripping	7 (20.6)	3 (8.8)	1 (4.2)	7 (29.2)
	Spurting	8 (23.5)	28 (82.4)	9 (37.5)	16 (66.7)

Figure 1 illustrates this pattern for the four musculoskeletal pain indicators in the intervention group. Across all four sites, the proportion of mothers reporting no pain rose sharply from visit one to visit six, with the largest absolute gain seen for abdominal pain (38.2% to 97.1%) and lower-back pain (29.4% to 85.3%), and comparable gains for thigh and calf pain (47.1% to 91.2% for both).

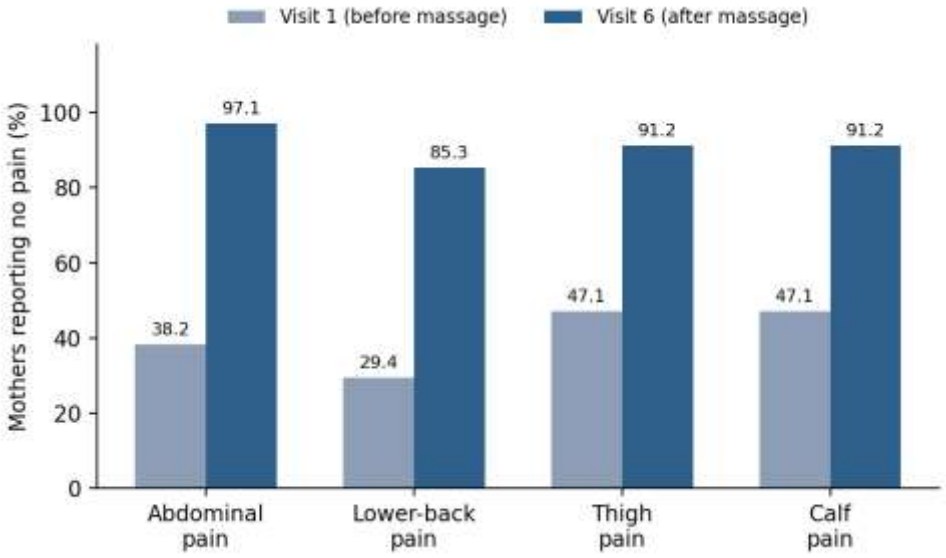

Fig 1: Proportion of Intervention-Group Mothers Reporting No Musculoskeletal Pain at Visit 1 versus Visit 6 (n = 34)

Within-Group Differences: Wilcoxon Signed-Rank Test

Table 3 presents the results of the Wilcoxon signed-rank test comparing each group's own status between the first and sixth visits. In the intervention group, all nine recovery indicators improved significantly between visit one and visit six ($p<0.01$). In the control group, most indicators showed no statistically significant change over the same interval ($p>0.01$); the exceptions were lochia color and perineal-wound healing, which improved significantly even without massage ($p<0.01$), and abdominal pain, which improved significantly at the conventional $p<0.05$ threshold but not at $p<0.01$. This pattern indicates that lochial progression and perineal healing follow a relatively fixed physiological timetable regardless of massage, whereas the remaining indicators - most notably uterine involution and musculoskeletal pain - showed little spontaneous improvement without the intervention.

Table 3. Wilcoxon Signed-Rank Test Comparing Visit 1 and Visit 6 within Each Group

Indicator	Intervention Z	Intervention p	Control Z	Control p
Uterine fundal height	-5.130	0.000	-1.833	0.067
Abdominal striae	-4.359	0.000	-0.333	0.739
Lochia color	-5.099	0.000	-4.155	0.000
Perineal wound	-5.026	0.000	-4.355	0.000
Abdominal pain	-4.848	0.000	-2.138	0.033
Lower-back pain	-4.593	0.000	-0.775	0.439
Thigh pain	-4.658	0.000	-1.213	0.225
Calf pain	-4.610	0.000	-0.237	0.813
Breast-milk flow	-4.850	0.000	-1.667	0.096

Between-Group Differences: Mann-Whitney U Test

Table 4 presents the results of the Mann-Whitney U test comparing the intervention and control groups at the first visit and again at the sixth visit. At the first visit, before any massage had been given, none of the nine indicators differed significantly between the two groups ($p>0.01$ in every case), confirming that the groups were adequately comparable at baseline despite the non-randomized allocation. By the sixth visit, after six massage sessions in the intervention group, all nine indicators differed significantly between groups ($p<0.01$), except abdominal striae and abdominal pain, which differed at the more conventional

p<0.05 level. Because the two groups did not differ at baseline but did differ substantially by the sixth visit, and because within-group improvement was consistently larger and more uniform in the intervention group (Table 4), the between-group difference observed at visit six is best explained by the massage intervention itself rather than by pre-existing differences between the groups or by the unassisted course of postpartum recovery.

Table 4. Mann-Whitney U Test Comparing the Intervention and Control Groups at Visit 1 and Visit 6

Indicator	Visit 1 Z	Visit 1 p	Visit 6 Z	Visit 6 p
Uterine fundal height	-1.290	0.197	-3.635	0.000
Abdominal striae	-0.889	0.374	-2.314	0.021
Lochia color	-0.319	0.750	-3.046	0.002
Perineal wound	-1.740	0.082	-7.219	0.000
Abdominal pain	0.450	0.652	-2.179	0.029
Lower-back pain	0.580	0.562	-4.905	0.000
Thigh pain	-0.518	0.605	-2.981	0.003
Calf pain	-0.052	0.958	-3.791	0.000
Breast-milk flow	0.311	0.756	-4.062	0.003

Discussion

The postpartum period is the interval immediately after the birth of the baby, placenta, and membranes until the reproductive organs return to their non-pregnant state; it is generally described as lasting six to eight weeks, although the exact duration is not sharply defined and some maternal health problems persist beyond it (Lopez-Gonzalez & Kopparapu, 2022). It is marked by anatomical and physiological changes related to uterine involution and lactation, as well as substantial psychological and social adjustment as the mother settles into her new role (Chauhan & Tadi, 2022).

The finding that uterine fundal height became non-palpable in most intervention-group mothers by the sixth visit (Table 2), and that this change was statistically significant only in the intervention group (Table 4), is consistent with the expected physiological pace of uterine involution, in which the fundus descends roughly 1 cm per day and typically becomes impalpable from the abdomen within about two weeks postpartum (Chauhan & Tadi, 2022). It is also consistent with prior findings that effleurage-based massage of the abdominal region can reduce afterpains and appears to support the involution process, likely by promoting local circulation and reducing myometrial guarding, in Indonesian primary-care samples (Herlina & Handayani, 2023).

Abdominal striae, caused by overstretching and micro-tearing of dermal collagen and elastin fibers during pregnancy, showed a small but significant improvement after massage (Table 2, Table 4), though the between-group difference at visit six was more modest (p<0.05 rather than p<0.01; Table 5). This is broadly consistent with the dermatological literature, which describes striae gravidarum as a connective-tissue change that tends to fade gradually regardless of treatment, while noting that regular massage - alone or combined with topical emollients - is one of the few interventions associated with some improvement in skin condition and patient-reported satisfaction (Antoszewski et al., 2015; Farahnik et al., 2017). The comparatively smaller effect size for striae, relative to pain and functional indicators, likely reflects the fact that striae represent a structural dermal change that resolves more slowly than the muscular and circulatory changes targeted directly by massage.

Lochia progressed from red toward yellowish/clear more consistently in the intervention group, in line with the normal lochial sequence from lochia rubra to lochia serosa and lochia alba over roughly three to four

weeks (Lopez-Gonzalez & Kopparapu, 2022); however, this indicator also improved significantly in the control group (Table 4), suggesting that lochia progression follows a relatively fixed uterine-healing timetable that massage may support but does not primarily drive. Perineal-wound healing followed a similar pattern - significant improvement in both groups, but a markedly larger between-group difference by visit six (Table 5) - consistent with reviews indicating that adjunctive physical therapies can support, but are not the sole determinant of, perineal recovery, which also depends on wound severity, hygiene, and individual healing capacity (Girsang & Elfira, 2023; El-Lassy & Madian, 2018).

The pain outcomes are the clearest evidence of a massage-specific effect: abdominal, lower-back, thigh, and calf pain all improved significantly in the intervention group but not (or only marginally) in the control group (Table 4, Figure 1), and all four differed significantly between groups by visit six (Table 5). These results are consistent with the physiological mechanisms of the three massage techniques applied. Effleurage promotes venous and lymphatic drainage, helps clear metabolic waste such as lactic acid, and increases arterial blood flow carrying oxygen and nutrients to the tissue, producing localized warmth that supports relaxation and reduces stiffness (Hollis, 2009; Hinds et al., 2004). Petrissage, the kneading and squeezing of tissue, acts as a pumping action on underlying capillaries and veins, increasing local blood supply, accelerating metabolic-waste removal, and increasing tissue extensibility (Jarmila et al., 2009). Friction, pressure applied with the fingers or thumb across or in a circular motion over muscle fibers, increases localized circulation, helps release fibrous adhesions, and improves the nutrition and function of surrounding ligament and joint structures, thereby accelerating tissue healing and reducing pain (Loew et al., 2014; Mckechnie et al., 2007). This mechanistic picture is consistent with the meta-analytic finding that massage significantly reduced pain after caesarean birth and at seven days postpartum in controlled trials (Smith et al., 2022), and with the broader complementary-therapy literature reporting significant post-caesarean pain benefits from massage-based interventions (Lima-De-La-Iglesia et al., 2024).

Breast-milk flow shifted markedly from oozing/dripping toward spurting in the intervention group, consistent with reports that back and chest-wall massage stimulating the thoracic region can promote oxytocin-mediated milk ejection and increase reported milk volume in postpartum mothers (Faiza et al., 2023; Lismidiati et al., 2022). Because Moyer et al.'s (2011) quantitative review found only a small, inconsistent effect of massage therapy on circulating cortisol, the improvement in milk flow observed here is more plausibly explained by a direct oxytocin-mediated let-down mechanism, supported by the mother's improved physical comfort and relaxation, than by a large reduction in stress-hormone levels alone.

Taken together, three lines of evidence in this study point toward a genuine intervention effect rather than the unassisted course of postpartum recovery: the intervention group improved significantly on all nine indicators while the control group improved significantly on only two to three; the two groups were statistically indistinguishable at baseline (Table 5, visit 1); and a significant between-group difference emerged only after the massage sessions had been delivered (Table 5, visit 6). This pattern extends earlier single-technique, single-outcome, uncontrolled studies of postpartum massage (Herlina & Handayani, 2023; Faiza et al., 2023) by demonstrating that a combined effleurage-petrissage-friction protocol produces coordinated improvement across multiple recovery domains simultaneously, and it responds directly to the call in the complementary-therapy literature for better-controlled trials of postpartum massage (Smith et al., 2022).

CONCLUSION

This study found that a standardized, six-session relaxation and fitness massage protocol combining effleurage, petrissage, and friction techniques had a significant effect on postpartum recovery in mothers after childbirth. In the intervention group, all nine recovery indicators - uterine fundal height, abdominal striae, lochia color, perineal-wound healing, abdominal pain, lower-back pain, thigh pain, calf pain, and breast-milk flow - improved significantly between the first and sixth visits ($p<0.01$), while the control group showed significant improvement on only two indicators (lochia color and perineal-wound healing) that appear to follow a relatively fixed physiological healing timetable. Before the intervention began, the two groups were statistically comparable on every indicator; by the sixth visit, the intervention group differed significantly from the control group on all nine indicators ($p<0.01$, or $p<0.05$ for striae and abdominal pain). These findings are consistent with, and extend, prior single-outcome studies of individual

massage techniques in postpartum care, and they support the physiological mechanisms by which effleurage, petrissage, and friction are understood to improve local circulation, reduce musculoskeletal pain, and support uterine, perineal, and lactation recovery. By evaluating a combined-technique protocol against a genuine control group across multiple recovery domains at once, this study moves the evidence forward from the largely single-outcome, uncontrolled designs that have dominated the postpartum-massage literature to date, and provides an initial evidence base for a standardized massage protocol for postpartum recovery. It is recommended that relaxation and fitness massage be offered as a complementary intervention for postpartum mothers, that the protocol described here be validated in larger, ideally randomized, multi-site trials, and that it be incorporated into midwifery training and community-service programs to strengthen practitioners' capacity to deliver this care.

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