International Research Journal of Multidisciplinary Scope (IRJMS), 2026; 7(2): 140-147

Original Article | ISSN (O): 2582-631X DOI: 10.47857/irjms.2026.v07i02.08713

Impact of Four-square Breathing Technique on Afterpains and Postpartum Blues: Effect of Non-pharmacological Therapy

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Abstract

Each woman experiences labor in her own unique way, making childbirth a special and memorable event. However, most new mothers face common discomforts such as postpartum blues and afterpains, which may affect their early recovery. A simple deep breathing method called "four-square breathing" has been shown to slow breathing, lower stress levels, and ease physical discomfort. The purpose of this study was to evaluate the impact of the four-square breathing technique on postnatal mothers' levels of afterpains and postpartum blues at selected hospitals in District Mohali, Punjab. The study used a quasi-experimental design and a quantitative research methodology. 120 postpartum mothers were selected using a non-probability convenience sampling technique, including 60 participants in each of the experimental and control groups. For three days in a row, the experimental group was instructed and given the four-square breathing technique, while the control group was given regular care. On the fourth day of the evaluation, postpartum blues were measured using a self-structured rating scale and afterpains were measured using a numerical pain rating scale. SPSS Version 18 was used to analyze the data at a significance level of $p < 0.05$. A significant difference was observed in the mean afterpain scores, with an unpaired t-value of 5.987, which exceeded the table value of 1.980 at the 0.05 level. A significant difference was also found in postpartum blues scores, with an unpaired t-value of 10.641. The study concluded that four-square breathing is a cost-effective, safe, alternative method of lowering postpartum blues and afterpains in new mothers.

Keywords: Afterpains, Effectiveness, Four-square Breathing Technique, Postnatal Mothers, Postpartum Blues.

Introduction

The joy of welcoming a newborn into the world is the pleasure experienced during birth (1). Every phase of labor has unique characteristics, and the mother contributes in a unique way to the important experiences that take place along her journey (2). During this period, women must acclimatize to the realities of their new roles as mothers as their bodies recover from pregnancy and childbirth (3).

A lot of mothers undergo physiological, psychological, and social changes during the postnatal period, which is a crucial time for both the mother and the newborn child. Both retrogressive (uterine and vaginal involution) and progressive (milk production for lactation, menstrual cycle restoration, and initiation of a parenting role) maternal modifications are characteristics of the postnatal phase (3, 4).

Afterpains are common phenomena after childbirth. The intensity of afterpains may be influenced by any condition that delays the uterus's process of subinvolution and, as a result, its return to its pre-pregnancy size (5). Afterpains are intermittent uterine contractions after delivery that are of different intensities. It is defined as aching uterine contractions that occur occasionally for approximately 2 or 3 days after delivery which may result from contractile attempts of the uterus to revert to its normal involuted condition. After giving birth, these contractions can occur in every uterus, irrespective of whether it is a vaginal or cesarean section delivery, but the pain is unique to each person (5-8).

Puerperium is a time of transition for mothers due to several transformations in the body, mind,

(Received 17th October 2025; Accepted 06th March 2026; Published 02nd April 2026)

and familial framework that require adjustment. Some mothers adjust to motherhood well, but some do not, and as a result, they suffer from a psychiatric condition called postpartum blues. The incapacity of a postpartum mother to adapt to her baby's arrival results in the condition known as postpartum blues which is the most common mood disturbance during the postnatal period. It is also referred to as baby blues. Approximately 80 -85% of mothers encounter these "baby blues" (9). Maternal blues is a transient state of mental illness and milder in nature. It generally begins 1-3 days after delivery and the main manifestations are irritability, headache, anxiety, clouding of consciousness, mood liability, and feeling of inadequacy, sadness, tearfulness, or crying "for no reason,". In addition, mothers may experience challenges with decision-making, appetite loss, exhaustion, sleep issues, and concentration issues (9-15).

Breathing exercises can help to decrease afterpains as well as stress (16-18). Mothers can have improved physical and mental well-being by practicing deep breathing. Four-square breathing is a deep breathing technique that slows down breathing. Four-square breathing is also called box breathing. It works to distract the mind, calm the nervous system, and decrease stress. It is a powerful breathing technique that can heighten performance and concentration. This breathing technique can help to return the breathing pattern to a relaxed rhythm. It provides a calm mind and can improve focus. This breathing technique is easy to do and quick to learn. It involves four basic steps each lasting for 4 seconds: (a) Breathing in, (b) Holding the breath, (c) Breathing out, (d) Holding the breath (17-22).

A study conducted to examine the impact of four-square breathing exercises on afterpains in postnatal mothers. An experimental study design was used among 80 postnatal mothers from the central part of Gujrat, India. Women who were 18 to 30 years old at the time of delivery and who had a live, single foetus at term were included. The researcher used a visual analogue numerical pain rating scale to collect data. The study showed that after manipulation (simple breathing exercise) the intensity of pain reduced. The study concluded that the four-square breathing was helpful in reducing afterpains (20).

In a past meta-analysis, the prevalence of postpartum blues ranges from 13.7% -76.0%. The study underlined the need of identifying the main signs of postpartum blues and putting in place training initiatives for mothers and healthcare professionals (23).

There are several techniques to treat the afterpains and postpartum blues, but mothers rarely use them. Therefore, mothers are in desperate need of pain and discomfort treatment that would help them feel better mentally. Breathing exercises are non-pharmacological, non-invasive, complementary, and alternative therapies that are cost-effective for reducing postpartum blues and afterpains in postnatal mothers. Four-square breathing is a popular breathing technique that can be practiced easily and quickly by mothers. There are fewer research studies available on the efficiency of breathing exercises in alleviating postpartum afterpains and postpartum blues. These considerations led to the development of the current research project, which aimed to assess post-test levels of afterpains and postpartum blues among postnatal mothers in the experimental and control groups, as well as to evaluate the effectiveness of the four-square breathing technique in reducing afterpains and postpartum blues in both groups.

Objectives of the Study

a) To evaluate the post-test level of afterpains among postnatal mothers in the experimental and control groups.
b) To determine the post-test level of postpartum blues among postnatal mothers in the experimental and control groups.
c) To assess the effectiveness of the four-square breathing technique on the level of afterpains among postnatal mothers.
d) To determine the effectiveness of the four-square breathing technique on the level of postpartum blues among postnatal mothers.

Methodology

A quasi-experimental, non-equivalent control group post-test-only design was used in this quantitative research project. The study was conducted in Punjab, India, at the Civil Hospital, phase-6, SAS Nagar, District Mohali. The study sample consisted of 120 primiparous postnatal mothers who fulfilled the inclusion criteria.

Among these 120 postnatal mothers, 60 were included in the experimental group and 60 in the control group. The study employed a non-probability convenient sampling technique. Participants in the study were primipara postnatal mothers admitted in Civil Hospital, phase -6, SAS Nagar, District Mohali, Punjab, India. The study's inclusion criteria encompassed Primipara mothers who underwent caesarean section at term, and breastfeeding their newborns. The study included those who were able to understand Hindi and English. The study excluded postnatal mothers who underwent normal vaginal and operative vaginal delivery, who were suffering from medical or obstetrical complications such as asthma, polyhydramnios, hypothyroidism, during the antenatal period etc. Postnatal women who had any pre-existing mental disorders, whose baby died during the perinatal period, and who were practicing relaxation techniques during the perinatal period. Postnatal women who had any clinical or systemic complication after caesarean section and with preterm and low birth weight babies were not included in the study.

The participants socio-demographic variables which give baseline information such as age, education status, occupation, family support during the postnatal period, socio-economic status, pregnancy planning, and number of antenatal visits and obstetrical variable such as type of caesarean section, baby gender, duration of breastfeeding, and fundal height were recorded.

Standardized Numeric Pain Rating Scale was used to assess afterpains (24). The Numeric Pain Rating Scale is a numeric version of the Visual Analogue scale. The mother's perceived level of afterpains was checked with a simple 11-point numerical rating scale. A 0 (no pain) to 10 (worst imagined pain) scale was used to rate the afterpains in the last 24 hours, including the worst, best, and current. The level of afterpains during the previous 24 hours was measured by the average of three assessments.

A three-point self-structured rating scale was used to evaluate the level of maternal blues on the 3rd postoperative day. Mothers were requested to listen to the items read out by the researcher and indicate the feeling experienced by her as compared to her usual feelings after delivery, by selecting the most appropriate description. The tool consists of 30 items. The minimum possible score was 0, and maximum possible score was 60 with 0 representing no blues,1-15 scores representing minimal blues,16-30 scores representing mild blues,31-45 scores representing moderate blues, and 46-60 representing severe postnatal blues.

The tool was given to 15 specialists in the nursing field (Obstetrical and gynaecological nursing, Mental health nursing) for content validity. Items were assessed for appropriateness, relevance, adequacy, and accuracy. Their insightful recommendations were acknowledged and implemented.

The reliability of both tools was calculated. The split half approach was utilized to estimate the reliability of the self-structured rating scale to evaluate postpartum blues, and the inter-rater method was utilized to find the reliability of the numerical pain rating scale. For Standardized Numeric Pain Rating scale to assess afterpains, r=0.816. For self-structured rating scale to assess postpartum blues, r=0.916. Hence, the tools were reliable.

Four square breathing is a deep breathing technique to be done twice a day. Breathing exercise is done after breastfeeding the baby**.** It was done with the help of a mobile application 'Box breathing'. It was done as follows:

a) Lie down on your back with one hand on the chest and one hand on the stomach
b) Breathe normally for a minute.
c) Observe the rise and fall of the chest and stomach.
d) Be aware of the breath to ensure that deep breathing allows the stomach to rise. Breath in while counting from 1 to 4 slowly through the nose. Fill the entire lungs.
e) Hold breath for four seconds.
f) Slowly exhale through the mouth for four seconds. Not to inhale for another four seconds.
g) Repeat 20 times.

The four-square breathing technique was implemented in the experimental group twice a day, on days 1 -3 days per the protocol developed. Both the experimental group and the control group completed a post-test

Data collected from 120 samples was organized, tabulated, analyzed using descriptive and

inferential statistics. The analysis was completed using statistical software SPSS Version 18 and Microsoft EXCEL 2010. Tables and figures were used to present the data. Mothers' demographic characteristics were examined using frequency and percentage distribution analysis. Utilizing the Chi-square test, the homogeneity between the experimental and control groups was determined. The effectiveness of four-square breathing on level of afterpains and postpartum blues among postnatal mothers was assessed using the unpaired test. A chi-square test was employed to establish the relationship between socio-demographic variables of postnatal mothers and their post-intervention level of afterpains and postpartum blues.

Results

Initially, the experimental and control groups were compared using the chi-square test and were found to be homogeneous with respect to socio-demographic variables such as age, educational status, occupation, family support during the postnatal period, socioeconomic status, pregnancy planning, and number of antenatal visits. The two groups were also homogeneous with regard to obstetrical variables, including type of caesarean section, infant gender, duration of breastfeeding, and fundal height.

Table 1: Level of afterpain in the experimental and control group (N=120, Maximum = 10, Minimum=0)

Level of Afterpains	Experimental Group (N=60) N (%)	Control Group(N=60) N (%)
Severe pain (7-10)	0 (0)	0 (0)
Moderate pain (4-6)	0 (0)	7 (11.7)
Mild pain (1-3)	23 (38.3)	36 (60)
No pain (0)	37 (61.7)	17 (28.3)

Table 1 shows that in the experimental group, after receiving the intervention majority of the mothers, 37 (61.7%), had no afterpains, and 23 (38.3%) experienced mild afterpains on the third postoperative day after the caesarean section. In the control group, the majority of the mothers 36 (60 %) experienced mild afterpains, 17 (28.1%) had no pain, and 7 (11.7%) had moderate afterpains on the third postoperative day after the caesarean section.

Table 2: Post-test level of postpartum blues in experimental and control groups (N=120, Maximum = 60, Minimum= 0)

Level Of Postpartum Blues	Experimental Group (N=60) N(%)	Control Group (N=60) N(%)
Severe blues (46-60)	0(0)	2(3.3)
Moderate blues (31-45)	0(0)	20(33.3)
Mild blues (16-30)	9(15)	24(40)
Minimal blues (1-15)	49(81.7)	14(23.3)
No blues (0)	2(3.3)	0(0)

Table 2 shows that in the experimental group, after receiving the intervention, the majority of the mothers, 49 (81.7%), had minimal blues, 9 (15%) had mild blues, and 2 (3.3%) had no blues on the third postoperative day after caesarean section. In the control group, the majority of the mothers, 24 (40%), had mild blues, 20 (33.3%) had moderate blues, and 2 (3.3%) had severe blues on the third postoperative day after caesarean section.

Table 3 shows that there was a significant difference in the mean level of afterpains of postnatal mothers. The calculated unpaired t-value was 5.987 which was greater than the table value 1.980 at 0.05 level of significance. Hence, the research hypothesis (H_1) is accepted that the post-test level of afterpains among postnatal mothers in the experimental group is significantly different from the control group at 0.05 level of significance.

Table 4 shows that there was a significant difference in the mean level of postpartum blues among experimental and control groups of postnatal mothers. The calculated unpaired t-value was 10.641 which was greater than the table value 1.980 at 0.05 level of significance. Hence, the research hypothesis (H_2) is accepted that the post-test level of postpartum blues among postnatal mothers in experimental group is significantly different from control group at 0.05 level of significance.

Table 3: Unpaired t-test showing effectiveness of four-square breathing technique on level of afterpains (N=120)

Group	Mean	SD	Unpaired t-test Value	p - value
Experimental Group	0.73	1.013	5.987	0.000*
Control Group	2.14	1.528		

NS: Non-significant *Significant at p<0.05 level

Table 4: Unpaired t-test showing the effectiveness of four-square breathing technique level of postpartum blues (N=120)

Group	Mean	SD	Unpaired t-test value	p - value
Experimental Group	8.33	5.442	10.641	0.000*
Control Group	24.97	10.816		

NS: Non-significant *Significant at p<0.05 level

Discussion

The current study assessed the effectiveness of the four-square breathing technique in reducing afterpains and postpartum blues among postnatal mothers and found statistically significant improvements in both outcomes in the experimental group when compared to the control group. These findings add to the emerging evidence that systematic breathing and relaxation-based therapies are effective, low-cost, and practicable non-pharmacological techniques in postnatal care (16, 18-22).

Afterpains are a common physiological complication of uterine involution and are sometimes exacerbated by breastfeeding, reducing maternal comfort and recovery (5, 7). Although pharmacological methods are still the predominant modality of pain management, concerns about side effects and breastfeeding safety have sparked interest in alternative nursing approaches (6).

In the present study, a substantially greater proportion of mothers in the experimental group reported absence or only mild afterpains compared to the control group. The post-test mean pain score differed significantly across groups ($t = 5.987$, $p < 0.05$). This finding is consistent with previous nursing intervention studies that have shown the efficacy of non-pharmacological treatments such fundal massage, leg raising exercises, reflexology, and relaxation in reducing afterpains (1-3, 8).

More precisely, the findings are consistent with previous research on breathing-based interventions, which found significant reductions in postpartum pain intensity and increased maternal satisfaction after structured breathing exercises, such as four-square breathing (16, 17, 19, 20). Controlled breathing has also been found to increase respiratory efficiency and generate psychological calm, indirectly lowering pain sensitivity and physiological stress responses (18, 21, 22).

Breathing techniques may have analgesic effects due to their influence on autonomic nervous system modulation, muscle tension reduction, and redirection of attention away from pain perception (24). Furthermore, systematic breathing practices have been demonstrated to reduce tension and anxiety, both of which have been linked to increased pain perception during the postpartum period (18).

However, variations in sample size, parity, pain assessment instruments, intervention timing, and individual pain thresholds may account for some heterogeneity in pain outcomes among studies. Furthermore, while interpreting the intervention impact, it is important to take into account the possibility that the normal course of uterine involution and postpartum healing may contribute to a gradual decrease in pain levels (6).

A significant percentage of new mothers worldwide suffer from postpartum blues, a minor but extremely common emotional disorder (9, 23). Its development has been linked to a number of circumstances, including hormonal changes, sleep loss, obstetric complications, a lack of social support, and psychological vulnerability (25). Significant incidence and symptom load among

postpartum women have also been founded by Indian studies (10, 13). With a highly significant difference in mean post-test scores ($t = 10.641$, $p < 0.05$), mothers who practiced four-square breathing in the current study demonstrated much lower levels of postpartum blues than the control group. This result is in line with comprehensive evaluations showing that mind-body and relaxation-based therapies greatly lessen the intensity of postpartum blues (11, 26).

Maternal emotional stability and coping during the early postnatal period have been demonstrated to be enhanced by interventions such bonding-focused therapy, relaxation training, meditation, and emotional regulation strategies (14, 15). Structured breathing techniques are known to lower stress, anxiety, and emotional dysregulation through parasympathetic activation and enhanced cognitive control, despite the lack of direct evidence regarding four-square breathing and postpartum blues (18).

Conclusion

The effectiveness of the four-square breathing technique in lowering postpartum blues and afterpains in primiparous postnatal women after cesarean section is demonstrated empirically in this study. The results show that women who got the intervention had much lower levels of emotional and physical discomfort than mothers who just received standard postnatal care. These findings demonstrate the importance of systematic breathing exercises as a crucial part of comprehensive postpartum care for mothers.

Establishing four-square breathing as a useful, non-invasive, and economical nursing intervention that addresses both the physiological and psychological aspects of postnatal recovery is the main contribution of this study. This method, in contrast to pharmacological treatments, is simple to teach and apply in clinical settings with little resources, and it poses no risk to breastfeeding or maternal safety. Additionally, the study adds context-specific knowledge to maternal health research by strengthening the small body of evidence from Indian healthcare contexts addressing complementary therapies for postnatal symptom management.

The results highlight the possibility of incorporating breathing techniques into regular postnatal education programs, nursing protocols, and discharge counselling from a clinical standpoint. Maternal comfort, emotional stability, patient satisfaction, and dependence on analgesics may all be improved by such integration. More broadly, the study is in favor of incorporating mind-body therapies into conventional postnatal care guidelines, especially in healthcare settings with limited resources. The study possesses a few limitations. Due to the quasi-experimental design, single-center setting, short follow-up period, and use of self-reported measures, generalizability may be restricted and response bias may be introduced. Furthermore, sustained pain reduction, maternal-infant attachment, and postpartum depression were not evaluated as long-term outcomes.

Randomized controlled trials with larger and more varied populations, longer follow-up periods, and objective outcome measures should be used in future studies. Further research comparing four-square breathing to other non-pharmacological therapies might shed more light on its relative efficacy. Investigating its effects on long-term maternal mental health and quality of life might also yield important information for all-encompassing postnatal care plans.

Abbreviation

SD: Standard Deviation.

Acknowledgement `

The authors express gratitude to all of the participants in this study, their parent institution, and the Civil Hospital Mohali administration.

Author Contributions

Rakhy Francis: conceptualization, conducted the study, collected the data, analysis, interpreted the data, drafted the manuscript and critical analysis, Shivani Sharma: conceptualization, critical analysis, Daljit Kaur: conceptualization, critical analysis, funding, Maria Mattu: conceptualization analysis, interpreted the data, critical analysis, Kritika Misra: conceptualization analysis, interpreted the data, critical analysis, Pardeep Kaur: conceptualization, critical analysis, funding, Renju S Varghese: conceptualization, conducted the study, collected the data, critical analysis, funding, Anu S Kannala: conceptualization, critical analysis, funding.

Conflicts of Interest

The authors certify that they have no conflicts of interest.

Data Availability

The corresponding author can provide the data supporting the study's conclusions upon reasonable individual request.

Declaration of generative AI and AI assisted technologies in the writing process

The authors declare no use of artificial intelligence (AI) for the write-up of the manuscript.

Ethics Approval

Formal permission was obtained from the ethical and research committee of the study center via letter no BFUHS/2024/p-TH/9730 to conduct the research study and also from the Senior Medical Officer (SMO) of Civil Hospital, SAS Nagar, Mohali, Punjab. Written informed consent has been obtained from the primi mothers who underwent caesarean section admitted to Civil Hospital, SAS Nagar, Mohali, Punjab. All the respondents were assured of confidentiality and anonymity.

Funding

This study was not specifically funded by any public, private, or nonprofit funding organization.

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How to Cite: Francis R, Sharma S, Kaur D, Mattu M, Misra K, Kaur P, Varghese RS, Kannala AS. Impact of Four-square Breathing Technique on Afterpains and Postpartum Blues: Effect of A Non-pharmacological Therapy. Int Res J Multidiscip Scope. 2026; 7(2): 140-147 . DOI: 10.47857/irjms. 2026.v07i02.08713