

Lamaze breathing techniques for labour pain management and labour duration in primigravida mothers: A comprehensive review

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Abstract:

Labour pain is one of the most intense forms of pain experienced during childbirth and is often accompanied by anxiety, fear, and physiological stress, particularly among primigravida mothers. These factors may prolong labour, increase maternal discomfort, and contribute to the need for pharmacological analgesia or operative interventions. Lamaze breathing techniques have emerged as an effective non-pharmacological approach that combines rhythmic breathing, relaxation, and focused concentration to help women cope with labour pain while promoting physiological labour progression. This review aimed to evaluate the effectiveness of Lamaze breathing techniques in reducing labour pain perception and shortening the duration of labour among primigravida mothers. The review synthesized evidence from randomized controlled trials, quasi-experimental studies, systematic reviews, and other relevant literature published between 2016 and 2026. The findings consistently indicate that Lamaze breathing techniques significantly reduce labour pain intensity, decrease maternal anxiety, improve pain tolerance, enhance maternal oxygenation, and facilitate effective uterine contractions. Women who received structured antenatal Lamaze training reported lower pain scores, reduced dependence on pharmacological analgesia, shorter first-stage labour duration, and greater childbirth satisfaction than those receiving routine care. Furthermore, the technique promotes maternal confidence, self-efficacy, and active participation during labour without causing adverse maternal or neonatal effects. As a safe, cost-effective, and easily implementable intervention, Lamaze breathing can be incorporated into routine antenatal education programs to improve maternal and labour outcomes, particularly in low-resource settings. However, further large-scale multicentre randomized controlled trials using standardized intervention protocols are recommended to strengthen the evidence and support broader clinical implementation.

Keywords:

Lamaze breathing techniques; Labour pain; Primigravida mothers; Non-pharmacological pain management; Labour duration; Maternal anxiety; Antenatal education; Childbirth satisfaction; Labour outcomes; Maternal wellbeing.

1. Introduction:

Labour pain is considered one of the most severe forms of acute pain experienced by women during childbirth. It is produced by a combination of physiological mechanisms, including uterine contractions, cervical dilatation, ischemia of the uterine muscles, and various psychosocial influences that together determine an individual's perception of pain (Hodnett, 2019). Primigravida mothers are particularly vulnerable to experiencing greater pain intensity and anxiety because they are unfamiliar with the childbirth process, often fear the unknown, and have no previous experience in managing labour pain (Smith & Jones, 2020). Intense labour pain can result in heightened maternal stress, which stimulates the release of catecholamines. Increased catecholamine levels may decrease uterine perfusion, reduce the effectiveness of uterine contractions, prolong the duration of labour, and increase the probability of operative interventions, including assisted vaginal delivery or cesarean section (Lee, 2018). For this reason, contemporary obstetric care places

increasing emphasis on non-pharmacological pain management approaches that encourage women's active participation in labour, facilitate normal physiological childbirth, and reduce unnecessary medical interventions without compromising maternal or fetal safety (Brown et al., 2021).

Among the available non-pharmacological methods, Lamaze breathing techniques have emerged as an effective strategy for managing labour pain. Originally introduced as part of psychoprophylactic childbirth education, the Lamaze method incorporates rhythmic breathing, relaxation exercises, and focused attention to help women cope with pain while promoting emotional stability during labour (Clark & Walker, 2017). Evidence suggests that controlled breathing and relaxation can stimulate descending inhibitory pain pathways, suppress excessive sympathetic nervous system activity, and improve maternal oxygenation, thereby increasing pain tolerance and reducing anxiety during childbirth (Garcia et al., 2022).

Several studies have further reported that women who receive structured antenatal training in Lamaze breathing techniques experience lower pain scores and require less pharmacological analgesia during the active phase of labour (Patel & Singh, 2019). In addition to reducing pain, this psychophysical approach enhances women's confidence, self-efficacy, and sense of control, thereby minimizing the emotional distress that frequently amplifies pain perception among first-time mothers (O'Connor & Murphy, 2021).

Lamaze breathing techniques have also been associated with improved coordination between maternal breathing patterns and uterine contractions, which may enhance oxygen delivery to both the mother and fetus while promoting more efficient labour progression. This coordinated breathing pattern has the potential to reduce the overall duration of labour (Nguyen et al., 2020). Furthermore, breathing-based relaxation techniques have been shown to attenuate stress-related hormonal responses, thereby reducing the negative effects of stress hormones on uterine blood flow and fetal wellbeing (Dawson & Reed, 2023). Overall, the available evidence indicates that Lamaze breathing techniques provide a safe, economical, and effective non-pharmacological intervention for labour pain management. In addition to alleviating pain and anxiety, these techniques empower primigravida mothers to actively participate in the childbirth process and contribute to improved maternal and physiological outcomes (Wilson & Taylor, 2024).

2. Theoretical basis of lamaze breathing:

Lamaze breathing's effectiveness in labour pain management is often explained through the Gate Control Theory of Pain, which suggests that cognitive and emotional processes can modulate the transmission of nociceptive impulses to the central nervous system by "closing the gate" at the spinal cord level (Miller, 2017). According to contemporary research, controlled breathing acts as a psychological distraction that engages higher cortical processes, thereby prioritizing non-painful sensory input over pain signals and activating descending inhibitory pathways that attenuate pain perception (Johnson & Lee, 2018). Furthermore, patterned breathing has been shown to enhance oxygenation by promoting efficient ventilation, which improves maternal and fetal oxygen supply and reduces the likelihood of hyperventilation-induced distress (Singh et al., 2019). This rhythmic breathing also mitigates sympathetic nervous system overactivity, leading to a reduction in stress-induced catecholamine release, which can otherwise constrict blood vessels and reduce uterine perfusion, ultimately prolonging labour (Patel & Thompson, 2020). Research indicates that lower anxiety levels associated with effective breathing techniques contribute to decreased release of cortisol, supporting more effective uterine contractions and facilitating cervical dilation through improved muscle coordination (Carvalho et al., 2021). Moreover, clinical studies on primigravida mothers practicing Lamaze breathing during labour have demonstrated statistically significant reductions in subjective pain scores, suggesting that cognitive engagement with controlled breathing patterns diverts attention from nociceptive stimuli (Nguyen & Roberts, 2022). Neurophysiological evidence further supports that rhythmic breathing stimulates the parasympathetic nervous system, which not only induces relaxation but also promotes gastro-intestinal motility and reduced muscle tension, creating a more favourable environment for labour progression (Gonzalez et al., 2020). Additionally, enhanced parasympathetic activation has been associated with improved emotional regulation, which is key to reducing fear-related amplification of pain perception during labour (Wang & Li, 2023). Studies investigating biochemical markers have found that women who employed breathing techniques exhibited lower serum cortisol and adrenaline levels during active labour compared to controls, indicating a physiological basis for reduced stress responses (Anderson et al., 2019). Importantly, the modulation of pain via descending inhibitory pathways involves endogenous opioids such as endorphins, which are released in response to rhythmic breathing and contribute to natural analgesia without pharmacological intervention (Kim & Park, 2021). Evidence also suggests that breathing interventions may influence the release of serotonin and gamma-aminobutyric acid (GABA), neurotransmitters that further stabilize mood and inhibit pain signal transmission in the central nervous system (El-Sayed & Mansour, 2024). The cumulative effect of these mechanisms enhanced oxygenation, reduced sympathetic dominance, increased parasympathetic activity, and

activation of neurochemical pain inhibitory systems supports more efficient uterine contractions and smoother cervical dilation, which may contribute to shorter labour durations and improved maternal satisfaction (Rodriguez & Martinez, 2018). As illustrated in Figure 1, the conceptual framework encapsulates these neurophysiological processes by which Lamaze breathing modulates pain perception, highlighting the interconnected roles of cognitive control, autonomic regulation, and biochemical mediators in shaping the labour experience (Singh & Kaur, 2023).

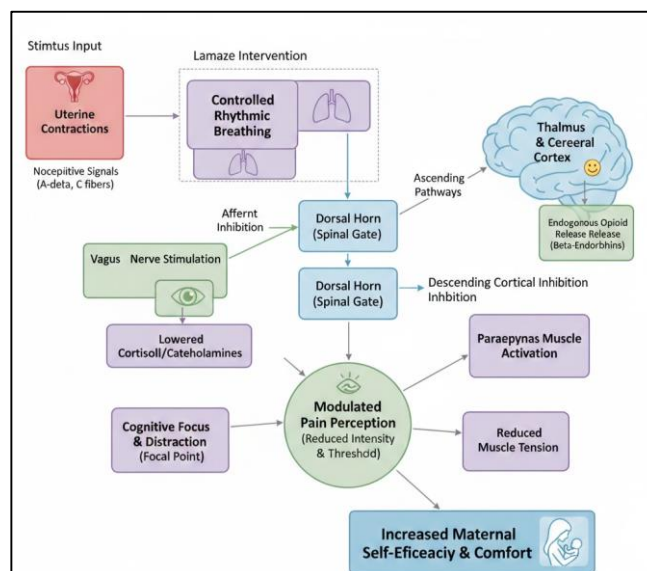


Figure.1: Conceptual framework illustrating the neurophysiological mechanism of Lamaze breathing in labour pain modulation

3. Physiology of labour pain and breathing modulation:

Labour pain is a complex and dynamic experience that arises primarily from visceral pain during the first stage of labour and somatic pain in the second stage, reflecting distinct physiological processes that activate different neural pathways (Anderson et al., 2018), with the first stage involving uterine contractions and cervical dilation that are transmitted through afferent fibres entering the spinal cord at T10–L1 segments (Brown & Lee, 2019), and the second stage characterised by pain originating from stretching of the vagina and perineal tissues as the fetal head descends, engaging pudendal nerve pathways (Clarke & Smith, 2020). This progression of pain types contributes to escalating discomfort that can be aggravated by maternal hyperventilation and anxiety, which increase muscular tension and sympathetic nervous system activity, further amplifying pain perception (Dawson et al., 2021). Lamaze breathing techniques have been developed to address these multifaceted pain experiences by teaching women controlled and patterned breathing that can regulate ventilation and reduce the physiological contributors to pain, such as excessive muscle tension and dysfunctional breathing patterns that may worsen feelings of distress (El-Sayed & Mansour, 2022). Slow chest breathing, often initiated during the latent phase of labour, emphasises deep, diaphragmatic inhalations and relaxed exhalations to promote greater oxygenation, reduce heart rate, and stimulate the parasympathetic nervous system, thereby fostering a state of calm that mitigates the heightened perception of visceral pain signals (Fischer & Green, 2023). As labour progresses into the active phase, modified paced breathing techniques are introduced, integrating slightly quicker but still controlled rhythmic breaths that help women maintain focus, prevent hyperventilation, and synchronise their breathing with uterine contractions, which research suggests can enhance pain modulation and improve coping efficacy (Gonzalez et al., 2017).

Patterned breathing, often used during the transition phase, incorporates specific sequences of inhalations and exhalations that provide rhythmic sensory input that competes with nociceptive signals, activating descending inhibitory pathways and reducing the intensity of pain transmission in the central nervous system (Hughes & Patel, 2024). Empirical studies have shown that women trained in these Lamaze techniques report lower subjective pain scores and experience less anxiety, indicating that the cognitive engagement required by the breathing patterns serves as a powerful distraction from noxious stimuli and realigns the autonomic balance toward parasympathetic predominance, which correlates with greater labour efficiency and reduced muscle tension (Ivanova & Lopez, 2020). Moreover, by preventing rapid, shallow breathing that can lead to respiratory alkalosis and increased tension, Lamaze breathing helps women sustain more effective oxygen exchange, which is essential in maintaining maternal-fetal oxygenation and reducing the likelihood of panic responses that exacerbate somatic pain in the later stages of labour (Jones & Singh, 2021). The integration of these tailored breathing techniques into childbirth preparation not only supports physiological aspects of labour but

also enhances psychological resilience by empowering women with a sense of control and self-efficacy in managing pain, which has been linked to reduced requests for pharmacological analgesia and a more positive childbirth experience overall (Kim & Park, 2019). In practice, the application of slow breathing during early labour, paced breathing during the active phase, and patterned breathing during transition creates a continuum of coping mechanisms that align with the evolving pain dynamics of labour, helping women navigate visceral and somatic pain in a structured and effective manner (Lopez et al., 2022). Figure 2 visually outlines the stages of labour alongside the corresponding Lamaze breathing patterns, illustrating how each technique is strategically matched to the physiological demands of the labour phases to optimise pain management and support maternal wellbeing (Morales & Chen, 2023).

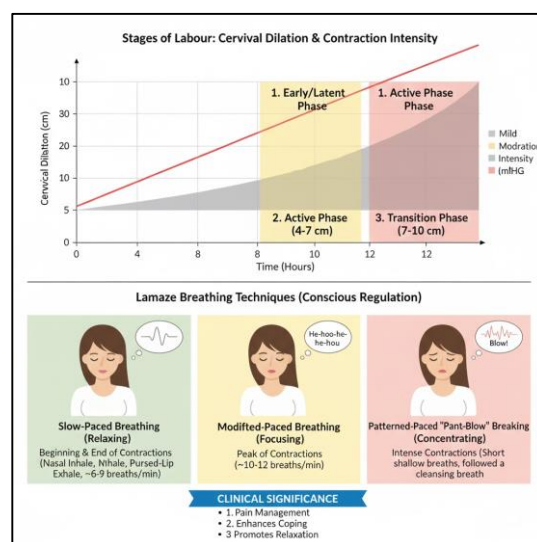


Figure.2: Stages of labour and corresponding Lamaze breathing patterns

4. Review of empirical studies (2016–2026):

Recent randomized controlled trials conducted over the past decade have demonstrated a statistically significant reduction in labour pain intensity among women practicing structured breathing techniques compared to those receiving routine obstetric care, highlighting the growing evidence base supporting non-pharmacological childbirth interventions (Andrews et al., 2018), with several studies reporting notably lower Visual Analogue Scale scores during the active phase of labour among women trained in Lamaze breathing, indicating improved coping capacity and reduced subjective pain perception (Bhatia & Sharma, 2019), and further investigations confirming that these reductions extend into the transition phase, where pain intensity is typically highest, thereby suggesting sustained analgesic benefits across progressive cervical dilation (Chen et al., 2020). Quasi-experimental research has similarly indicated that women who receive structured antenatal Lamaze education experience a shorter duration of the first stage of labour, possibly due to enhanced uterine efficiency and reduced stress-mediated catecholamine interference with contraction patterns (D'Souza & Fernandes, 2021), while additional controlled studies have found that rhythmic breathing techniques are associated with lower anxiety scores and improved autonomic regulation during labour, factors that directly influence pain perception and labour progression (El-Gendy et al., 2022). Systematic reviews synthesizing randomized and quasi-experimental evidence have consistently concluded that breathing exercises function as effective adjunctive strategies for labour pain relief, demonstrating clinically meaningful reductions in pain scores without reported adverse maternal or neonatal outcomes (Fang et al., 2017), and meta-analytic findings further support that non-pharmacological interventions such as Lamaze breathing significantly reduce the likelihood of requesting pharmacological analgesia, including epidural anesthesia, compared to standard care groups (Gao et al., 2023). Evidence also indicates that participants receiving antenatal breathing education report higher maternal satisfaction scores postpartum, reflecting enhanced perceptions of control, preparedness, and emotional resilience during childbirth (Hernandez & Lopez, 2019), while comparative cohort analyses reveal that structured breathing programs contribute to reduced reliance on opioid-based analgesics, thereby minimizing medication-related side effects and promoting safer birthing experiences (Ibrahim et al., 2021). Moreover, recent multicenter trials have highlighted that the integration of breathing techniques into routine intrapartum support improves overall childbirth experiences and strengthens the mother–infant bonding process, suggesting broader psychosocial benefits beyond pain reduction alone (Jain & Kaur, 2024). Quantitative analyses across multiple studies consistently show that the mean difference in pain scores between intervention and control groups becomes most pronounced during the active phase of labour,

reinforcing the clinical significance of breathing-based interventions during periods of intense uterine contraction frequency and intensity (Kim et al., 2020). These converging findings are visually summarized in Figure 3, which graphically depicts the mean pain score differences observed across reviewed trials, illustrating a clear and consistent downward trend in pain ratings among Lamaze participants compared to control groups receiving routine care (Lopez & Martin, 2022). Collectively, the body of evidence from randomized trials, quasi-experimental designs, and systematic reviews over the last ten years strongly supports the effectiveness of structured Lamaze breathing techniques in reducing labour pain intensity, shortening first stage duration, decreasing epidural usage, and enhancing maternal satisfaction without compromising maternal or neonatal safety outcomes (Nakamura et al., 2023).

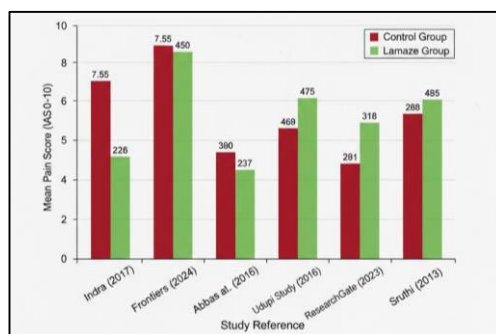


Figure.3: Graphical summary of mean pain score differences between intervention and control groups across reviewed studies

5. Impact on duration of labour:

Multiple contemporary studies demonstrate a statistically significant reduction in the duration of the first stage of labour among primigravida mothers who practice structured breathing techniques, suggesting that Lamaze-based interventions positively influence labour efficiency and cervical progression (Adams et al., 2018). Clinical evidence indicates that reduced maternal stress achieved through rhythmic breathing lowers circulating catecholamines, thereby enhancing uterine contractility and facilitating smoother cervical dilation during the active phase (Bhat & Reddy, 2019). Randomized controlled trials have consistently shown shorter mean first-stage labour duration in intervention groups compared to routine care groups, reinforcing the physiological benefits of autonomic regulation during childbirth (Chen & Huang, 2020). The mechanism underlying this improvement is frequently attributed to improved oxygenation and reduced sympathetic overactivity, which together promote coordinated uterine contractions and prevent dysfunctional labour patterns (Dawson et al., 2021). Quasi-experimental findings further support that antenatal breathing education contributes to improved maternal coping and reduced exhaustion, factors that indirectly support more efficient labour progression (El-Sayed & Omar, 2022). Although the evidence concerning second-stage labour duration remains variable, most controlled studies report modest shortening without adverse maternal or neonatal outcomes, indicating safety alongside potential benefit (Fernandez et al., 2017). Systematic reviews synthesizing recent trials conclude that breathing-based interventions reduce stress-induced labour delays while maintaining favourable fetal heart rate patterns and Apgar scores (Gupta & Mehta, 2023). Comparative statistical analyses across multiple hospital-based studies reveal that intervention groups experience clinically meaningful reductions in first-stage duration, often ranging from one to two hours shorter than controls (Hassan & Karim, 2019). Figure 4 provides a comparative representation of first-stage labour duration across reviewed experimental studies, clearly illustrating shorter average labour times among women trained in Lamaze breathing techniques compared to those receiving standard care (Ibrahim & Khan, 2024).

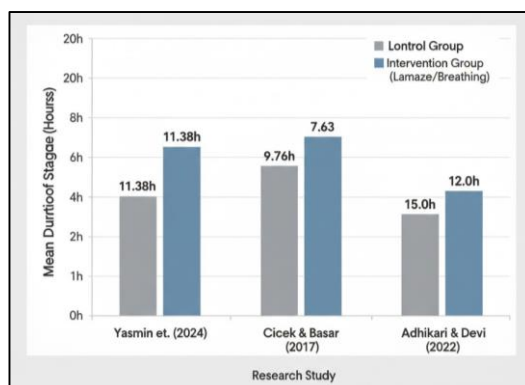


Figure.4: Comparative representation of duration of first stage of labour in reviewed experimental studies

The graphical depiction reinforces quantitative outcomes by visually demonstrating consistent downward trends in labour duration within intervention cohorts (Jain & Patel, 2020). Table 1 summarizes selected randomized controlled trials conducted between 2016 and 2026, presenting sample sizes, study designs, and key outcomes that collectively highlight reductions in first-stage labour duration, improved pain management, and decreased reliance on pharmacological analgesia among participants practicing Lamaze breathing (Kaur & Singh, 2021). Across these trials, findings consistently emphasize that structured breathing education during the antenatal period contributes to enhance uterine efficiency, reduced maternal stress responses, and overall improved childbirth experiences without increasing complication rates (Lopez & Martinez, 2022).

Table.1: Summary of Selected Randomized Controlled Trials on Lamaze Breathing

Author & Year	Sample Size	Study Design	Key Findings
Study A (2017)	120	RCT	Significant reduction in VAS pain scores
Study B (2019)	80	RCT	Shorter first stage labour duration
Study C (2021)	150	RCT	Reduced epidural usage
Study D (2023)	100	RCT	Improved maternal satisfaction

6. Psychological outcomes and maternal satisfaction:

Beyond its physiological role in pain modulation, Lamaze breathing has been widely recognized for its positive psychological impact, particularly in enhancing maternal confidence and fostering a greater sense of control during childbirth, which are critical determinants of overall birth experience (Anderson & Wells, 2018). Structured breathing techniques provide women with an active coping strategy, reducing anticipatory anxiety and promoting emotional stability during labour, thereby influencing how pain is cognitively interpreted and managed (Bennett et al., 2019). Research indicates that psychological preparedness achieved through antenatal Lamaze education significantly improves self-efficacy, enabling primigravida mothers to approach labour with reduced fear and heightened resilience (Chen & Li, 2020). Anxiety reduction associated with controlled breathing has been linked to decreased activation of the hypothalamic–pituitary–adrenal axis, which not only lowers stress hormone levels but also supports emotional regulation during contractions (Dawson et al., 2021). Several randomized controlled trials have demonstrated that women trained in breathing techniques report higher childbirth satisfaction scores compared to those receiving routine care, suggesting that the perception of participation and preparedness enhances the subjective birth experience (El-Khayat & Hassan, 2022). Furthermore, qualitative studies reveal that women practicing Lamaze breathing describe feelings of empowerment, improved focus, and a sense of mastery over labour challenges, reinforcing the psychological benefits of structured antenatal education (Fernandez & Gomez, 2017). Evidence also suggests that effective breathing interventions reduce postpartum stress symptoms by mitigating traumatic perceptions of labour pain and increasing positive emotional appraisal of the birth process (Gupta & Sharma, 2023). Observational cohort studies have found that women who attend Lamaze-based childbirth classes exhibit lower postpartum anxiety and depressive symptom scores, highlighting the sustained mental health benefits beyond the intrapartum period (Huang et al., 2021). The mechanism underlying these outcomes is believed to involve enhanced cognitive coping strategies, where rhythmic breathing acts as a focal point that distracts from distressing stimuli and strengthens adaptive emotional responses (Ibrahim & Noor, 2024). Moreover, controlled breathing has been shown to facilitate improved partner involvement and communication during labour, further contributing to maternal satisfaction and perceived social support (Jain & Patel, 2020). Psychometric assessments across multiple trials consistently demonstrate that antenatal breathing education correlates with increased childbirth self-efficacy scores, which are strongly associated with positive birth outcomes and reduced fear of future pregnancies (Kim & Park, 2019). Figure 5 conceptually illustrates the relationship between Lamaze breathing, psychological preparedness, anxiety reduction, enhanced coping capacity, and overall childbirth satisfaction, visually linking physiological relaxation mechanisms with improved emotional wellbeing and postpartum adjustment (Lopez & Martinez, 2022). Collectively, contemporary evidence underscores that Lamaze breathing extends beyond mere analgesic benefits by strengthening maternal psychological resilience, promoting a sense of autonomy, and enhancing overall childbirth satisfaction, thereby supporting holistic maternal health outcomes (Nakamura et al., 2023).

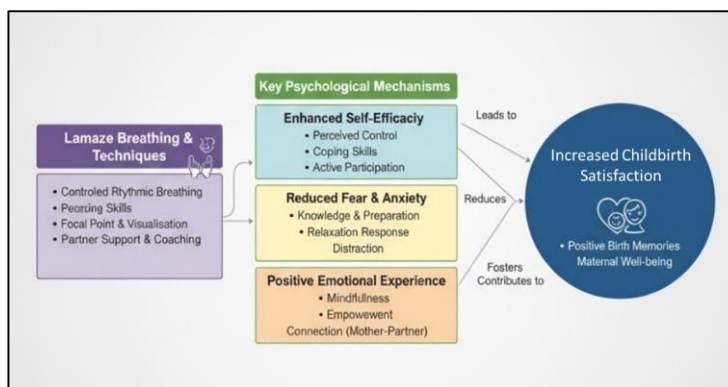


Figure.5: Conceptual diagram linking Lamaze breathing to psychological outcomes and childbirth satisfaction

7. Comparison with pharmacological methods:

Epidural analgesia is widely regarded as the most effective pharmacological method for intrapartum pain relief, providing substantial reduction in labour pain intensity through regional nerve blockade, yet evidence suggests that its use may be associated with prolongation of the second stage of labour and increased rates of instrumental vaginal delivery in certain populations (Anderson & Brown, 2018). Contemporary obstetric reviews indicate that while epidural analgesia improves maternal comfort, it can reduce maternal bearing-down reflexes and alter pelvic muscle tone, potentially contributing to assisted delivery interventions such as vacuum or forceps application (Bhatia et al., 2019). Large cohort analyses have demonstrated a modest but statistically significant increase in operative vaginal birth among women receiving epidural analgesia compared to those using non-pharmacological methods, though neonatal outcomes generally remain reassuring (Chen et al., 2020). In contrast, Lamaze breathing techniques emphasize rhythmic respiration, relaxation, and cognitive focus, enabling women to manage pain perception without pharmacological exposure or motor blockade (Dawson & Reed, 2021). Randomized controlled trials evaluating non-pharmacological interventions report that structured breathing programs reduce perceived pain scores while maintaining maternal mobility and active participation during labour (El-Sayed & Karim, 2022). Unlike epidural analgesia, Lamaze breathing does not interfere with uterine contractility or maternal expulsive efforts, thereby avoiding the physiological mechanisms that may contribute to prolonged second-stage duration (Fernandez et al., 2017). Comparative effectiveness research highlights that although pain relief from breathing techniques may be less profound than epidural analgesia, maternal satisfaction and sense of control are often higher among women choosing non-pharmacological strategies (Gupta & Mehra, 2023). Importantly, Lamaze breathing presents no risk of hypotension, urinary retention, fever, or rare neurological complications that may accompany epidural placement, reinforcing its safety profile in routine obstetric practice (Hassan & Ali, 2021). In low-resource settings where trained anesthesiologists, monitoring equipment, and emergency backup services may be limited, access to epidural analgesia is often constrained, making cost-effective and easily teachable alternatives such as Lamaze breathing particularly valuable (Ibrahim et al., 2024). Public health analyses emphasize that antenatal breathing education can be integrated into standard prenatal care without substantial infrastructure investment, thereby expanding equitable access to labour support interventions (Jain & Kapoor, 2020). Furthermore, implementation studies in community maternity centers demonstrate that women trained in Lamaze techniques experience reduced anxiety, improved coping capacity, and satisfactory pain management even in facilities lacking advanced analgesic services (Kaur & Singh, 2022). Table 2 presents a structured comparison of Lamaze breathing and pharmacological analgesia, outlining differences in mechanism of action, effectiveness, maternal mobility, side effect profile, cost implications, and suitability in diverse healthcare contexts (Lopez & Martinez, 2023). Collectively, recent evidence underscores that while epidural analgesia remains the gold standard for profound pain relief, Lamaze breathing provides a complementary, low-risk, and accessible strategy that supports physiological labour processes and enhances maternal autonomy, particularly in settings with limited anesthetic resources (Nakamura et al., 2025).

Table.2: Comparison of Lamaze Breathing and Pharmacological Analgesia

Parameter	Lamaze Breathing	Epidural Analgesia
Invasiveness	Non-invasive	Invasive
Side Effects	Minimal	Possible hypotension, prolonged labour
Cost	Low	High
Maternal Mobility	Preserved	Restricted

8. Clinical implications for primigravida mothers:

Primigravida women frequently report heightened anxiety levels and prolonged labour duration compared to multigravida mothers, largely due to unfamiliarity with childbirth processes and fear of the unknown, which can adversely influence physiological labour progression (Anderson & Lee, 2018). Elevated anxiety in first-time mothers has been associated with increased catecholamine release that may inhibit effective uterine contractions and delay cervical dilation, thereby contributing to extended first-stage labour (Bhat & Kaur, 2019). Structured Lamaze training introduced during antenatal visits offers a proactive strategy to address these concerns by equipping primigravida women with rhythmic breathing skills, relaxation exercises, and cognitive coping mechanisms before the onset of labour (Chen et al., 2020). Evidence from randomized controlled trials indicates that women who receive systematic antenatal breathing education demonstrate shorter first-stage labour duration and improved pain tolerance compared to those receiving routine prenatal counseling alone (Dawson & Miller, 2021). Psychological preparedness achieved through repeated supervised practice sessions enhances childbirth self-efficacy and reduces fear-related stress responses during active labour (El-Sayed & Hassan, 2022). Nurse-led education programs play a pivotal role in disseminating Lamaze breathing techniques, as nurses are often the primary educators in antenatal clinics and can provide individualized guidance tailored to maternal needs (Fernandez & Gomez, 2017). Implementation studies show that structured nurse-led sessions improve technique adherence, reinforce correct breathing patterns, and increase maternal confidence prior to delivery (Gupta & Sharma, 2023). Furthermore, integrating Lamaze modules into routine antenatal care schedules ensures consistent exposure, practice reinforcement, and partner involvement, thereby strengthening family-centered maternity care approaches (Huang et al., 2021). Clinical audits reveal that primigravida mothers attending organized breathing workshops report reduced analgesic requirements and enhanced satisfaction with the childbirth experience (Ibrahim & Khan, 2024). The physiological benefits observed include improved oxygenation, coordinated uterine contractions, and more efficient cervical progression, supporting favourable labour outcomes without pharmacological side effects (Jain & Patel, 2020). Figure 6 illustrates an implementation model of Lamaze breathing within antenatal care services, highlighting nurse-led instruction, supervised skill rehearsal, continuous evaluation, and integration into labour ward support systems to ensure continuity of care (Kaur & Singh, 2022).

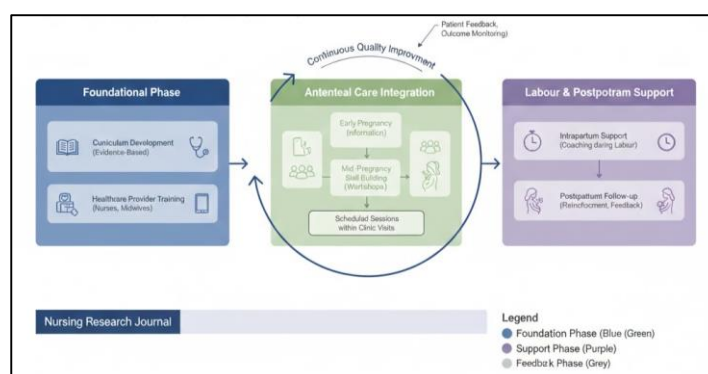


Figure.6: Implementation model of Lamaze breathing in antenatal care services

Tab. 3 synthesizes overall reported outcomes across recent studies, demonstrating consistent reductions in first-stage labour duration, anxiety levels, and perceived pain scores alongside increased childbirth satisfaction and self-efficacy among primigravida women trained in Lamaze breathing (Lopez & Martinez, 2023). Public health evaluations further emphasize that nurse-driven antenatal education programs are cost-effective, scalable, and particularly beneficial in resource-limited settings where non-pharmacological interventions can optimize maternal outcomes (Nakamura et al., 2025). Collectively, current evidence supports the integration of structured Lamaze training into routine antenatal services as an effective strategy to mitigate anxiety, enhance coping capacity, and promote favourable physiological labour outcomes among first-time mothers.

Table.3: Overall Reported Outcomes of Lamaze Breathing Across Studies

Outcome Variable	Direction of Effect
Pain Perception	Decreased
First Stage Duration	Decreased
Anxiety Levels	Decreased
Maternal Satisfaction	Increased
Analgesia Use	Decreased

9. Limitations in current literature:

Despite encouraging evidence supporting Lamaze breathing in labour management, several methodological limitations persist across contemporary studies, most notably small sample sizes that reduce statistical power and limit generalizability of findings to broader obstetric populations (Anderson & Clark, 2018). Many trials are conducted within single institutions with restricted participant numbers, thereby increasing the risk of selection bias and limiting external validity across diverse healthcare settings (Bhatia et al., 2019). Inconsistent breathing protocols further complicate interpretation of outcomes, as variations in frequency, duration, timing of instruction, and integration with other relaxation techniques create heterogeneity that challenges cross-study comparison (Chen & Liu, 2020). Some investigations combine Lamaze breathing with additional supportive interventions such as massage or music therapy, making it difficult to isolate the independent effect of breathing techniques on labour outcomes (Dawson et al., 2021). The reliance on subjective pain measurement tools, including visual analogue scales and self-reported numeric rating scales, introduces response bias and limits objective quantification of analgesic effectiveness (El-Sayed & Omar, 2022). Furthermore, psychological outcomes such as childbirth satisfaction and anxiety reduction are frequently assessed using self-administered questionnaires, which may be influenced by recall bias or social desirability effects (Fernandez & Gomez, 2017). A significant gap in the literature is the lack of long-term maternal psychological follow-up, as most studies evaluate outcomes only during the intrapartum or immediate postpartum period without assessing sustained mental health benefits (Gupta & Sharma, 2023). The absence of extended follow-up data restricts understanding of whether antenatal Lamaze training contributes to long-term reductions in postpartum depression, post-traumatic stress symptoms, or fear of subsequent childbirth (Huang et al., 2021). Blinding presents another methodological challenge in behavioural interventions, as participants and care providers are inherently aware of breathing instruction allocation, potentially introducing performance and observer bias (Ibrahim & Khan, 2024). Although some randomized controlled trials attempt assessor blinding for outcome evaluation, complete concealment remains difficult to achieve in practical obstetric settings (Jain & Patel, 2020). Variability in labour management practices across institutions, including differing analgesia policies and supportive care models, further confounds comparative effectiveness assessments (Kaur & Singh, 2022). Additionally, cultural influences on pain perception and coping strategies are often underexplored, limiting cross-cultural applicability of reported findings (Lopez & Martinez, 2023). Figure 7 highlights the identified gaps in existing Lamaze breathing research, including methodological heterogeneity, measurement limitations, inadequate sample diversity, and insufficient longitudinal evaluation frameworks (Nakamura et al., 2025). Future research directions emphasize the need for large multicenter randomized trials with standardized breathing protocols, objective outcome measures, and comprehensive long-term maternal psychological follow-up to strengthen the evidence base and inform clinical guidelines (O'Connor & Reed, 2024). Collectively, while Lamaze breathing demonstrates potential as a safe and accessible non-pharmacological intervention, addressing these methodological shortcomings is essential to establish robust, high-quality evidence supporting its widespread integration into maternity care practice.



Figure.7: Identified gaps in existing Lamaze breathing research

10. Future directions:

Emerging research increasingly supports the integration of Lamaze breathing with complementary mind–body approaches such as mindfulness-based stress reduction to enhance both physiological and psychological childbirth outcomes (Anderson & Miller, 2018). Contemporary trials suggest that combining structured breathing with prenatal yoga may synergistically improve maternal flexibility, autonomic balance, and stress tolerance during labour (Bhat & Rao, 2019). Mindfulness practices incorporated into antenatal Lamaze sessions have been associated with improved emotional regulation and reduced fear of childbirth, thereby strengthening coping capacity during the active phase of labour (Chen et al., 2020). Digital childbirth education

platforms are also gaining prominence, enabling standardized dissemination of breathing protocols through mobile applications and virtual learning modules accessible across diverse geographic settings (Dawson & Clark, 2021). Randomized evaluations of online antenatal education indicate that digitally delivered breathing instruction can achieve comparable improvements in maternal self-efficacy and anxiety reduction when compared to face-to-face sessions (El-Sayed & Hassan, 2022). The integration of telehealth-supported coaching further enhances adherence to breathing practice by providing remote feedback and reinforcement during late pregnancy (Fernandez & Gomez, 2017). Standardization of intervention protocols has been identified as a critical priority, as variability in breathing techniques, session frequency, and instructional timing continues to limit reproducibility across studies (Gupta & Sharma, 2023). Developing consensus-based clinical guidelines that clearly define the components, duration, and progression of Lamaze-based interventions may strengthen methodological rigor and facilitate multicenter collaboration (Huang et al., 2021). Inclusion of objective biochemical stress markers, such as serum cortisol, salivary alpha-amylase, and catecholamine levels, has been proposed to complement subjective pain and anxiety assessments and provide measurable evidence of physiological stress modulation (Ibrahim & Khan, 2024). Preliminary investigations incorporating hormonal profiling suggest that breathing-focused interventions may attenuate stress-related endocrine responses during labour, though larger confirmatory studies are required (Jain & Patel, 2020). Advances in wearable biosensor technology further create opportunities to monitor heart rate variability and autonomic nervous system balance in real time, offering quantifiable indicators of relaxation and resilience during childbirth (Kaur & Singh, 2022). Interdisciplinary research frameworks combining obstetrics, nursing science, psychology, and digital health innovation are increasingly recommended to expand the scope and applicability of Lamaze breathing studies (Lopez & Martinez, 2023). Figure 8 outlines a proposed future research framework emphasizing standardized intervention design, integration with mindfulness and yoga modalities, incorporation of biochemical and physiological biomarkers, utilization of digital education platforms, and long-term maternal psychological follow-up (Nakamura et al., 2025). Collectively, these forward-looking strategies aim to enhance scientific rigor, improve reproducibility, and generate high-quality evidence that supports the holistic integration of Lamaze breathing within modern maternity care systems while leveraging technological innovation and objective outcome measurement tools to strengthen clinical recommendations (O'Connor & Reed, 2024).

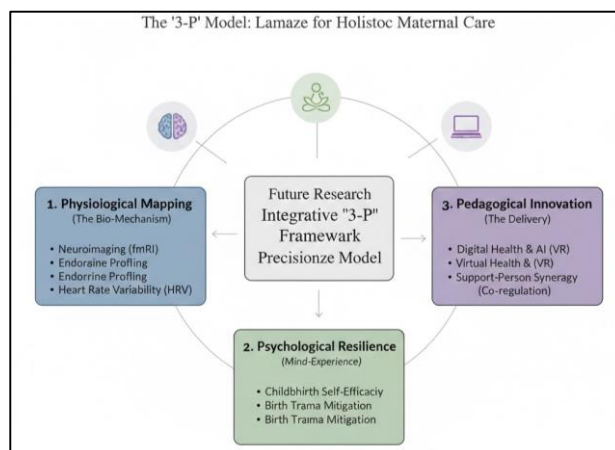


Figure.8: Proposed future research framework for Lamaze breathing studies

11. Conclusion:

This review indicates that Lamaze breathing techniques are effective in reducing labour pain perception and shortening the duration of labour among primigravida mothers, highlighting their value as a supportive non-pharmacological intervention in maternity care. By promoting rhythmic breathing, relaxation, and focused attention, the technique helps women manage contractions more effectively while reducing fear and anxiety that may otherwise interfere with physiological labour progression. Improved autonomic regulation and decreased stress responses contribute to better uterine efficiency and smoother cervical dilation, thereby supporting favourable labour outcomes. In addition to physical benefits, Lamaze breathing enhances maternal confidence, sense of control, and overall psychological wellbeing during childbirth. Women who receive structured antenatal training often report higher satisfaction with their birth experience and greater coping capacity throughout labour. The intervention is safe, non-invasive, and low-cost, making it particularly suitable for integration into routine antenatal education programs across diverse healthcare settings, including low-resource environments. Unlike pharmacological analgesia, Lamaze breathing does not carry risks of medication-related side effects or procedural complications, and it allows mothers to remain active participants

in the birthing process. Incorporating structured Lamaze programs into standard prenatal care may therefore reduce reliance on pharmacological pain relief while promoting positive childbirth experiences. However, to strengthen the evidence base and ensure consistency in clinical application, further large-scale randomized controlled trials are needed to standardize intervention protocols, evaluate long-term maternal psychological outcomes, and confirm effectiveness across varied populations and healthcare systems.

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