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The Effects of Mindfulness on Lactation: An Integrative Review

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Abstract

Background: It is well-known that stress and high levels of cortisol can negatively impact lactation outcomes. Mindfulness techniques are also known to be effective at reducing stress, and there has been some research into the effects of these techniques on breastfeeding. However, there has not yet been an integrative review examining the outcomes of the research carried out on this subject in the past 10 years.

Objectives: The objective of this integrative review was to assess the effect of mindfulness techniques on lactation. This includes the effects on maternal stress, both perceived and physiologic, milk composition and volume, as well as the effects on the infants.

Methods: The electronic databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Scopus, and Cochrane were searched using the key terms “meditate, meditation, relaxation or mindfulness” and “breastfeeding or lactation.”

Results: Nine articles met the inclusion criteria. Six key themes were identified. Mindfulness techniques reduce perceived and physiologic maternal stress and increase infant growth, particularly in the late preterm early term infant population. Infant behavior was also impacted by maternal mindfulness techniques as well as maternal milk volume, expression, and breastfeeding/pumping frequency. However, the effectiveness of mindfulness techniques is dose dependent.

Conclusions: Mindfulness techniques are a simple and practical tool for postpartum breastfeeding people that have the potential to improve both lactation and infant outcomes.

Keywords: meditation, relaxation, mindfulness, lactation, breastfeeding

Introduction

THE VALUE OF HUMAN milk cannot be overstated. It serves as the optimal source of nutrition for infants and provides both short- and long-term health benefits for both the infant and the mother.¹ Human milk is crucial for the infant’s immune system, growth, and overall development.² Apart from the health benefits for infants, breastfeeding also provides mothers with improved postpartum recovery and is associated with a decrease in the development of breast and ovarian cancer, diabetes, cardiovascular diseases, and osteoporosis.³

However, it is widely recognized that exclusive breastfeeding rates throughout the world are low. Globally, only

48% of mothers exclusively breastfeed their infants up to 6 months.⁴ Initiatives to improve breastfeeding rates primarily focus on providing additional support, and less research has been carried out on the effects of maternal physiological and psychological state. Stress can influence the hypothalamic–pituitary–adrenal axis and negatively impact lactation either directly by inhibiting prolactin and oxytocin or indirectly by acting on specific regions in the central nervous system.⁵ Furthermore, the milk ejection reflex can be impaired by lower levels of oxytocin caused by acute physical and mental stress.⁶

Furthermore, breastfeeding is a dynamic process between mother and infant that consists of the complex signaling

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between the dyad.⁷ It has been found in the literature that increased maternal cortisol (owing to stress) negatively impacts human milk output, milk composition, infant behavior, and infant growth.^{8–10}

Mindfulness techniques have been found to effectively decrease physiological markers of stress, for example, cortisol, in a range of populations.¹¹ These techniques are practical in that they are of low cost, low risk, and easily implementable in a wide variety of settings. Complementary and alternative medicine are becoming increasingly popular, yet despite the use of these practices, there have been few studies that focused on the specific impact of the mindfulness modality on the postpartum population.¹²

There have been previous reviews that explored the effectiveness of psychological relaxation interventions using relaxation therapy to improve breastfeeding outcomes,¹³ as well as studies that explored the effects of specific mindfulness techniques on different breastfeeding and infant outcomes.^{13–19} Therefore, the goals of this integrative review were to: (1) explore literature from the past decade to determine if mindfulness techniques as a whole have an effect on lactation and (2) explore if mindfulness interventions implemented in postpartum breastfeeding mothers would impact their infants.

Methods

Methodology

The methodological steps proposed by Whitemore and Knafl in 2005 were followed in this integrative review to decrease bias and improve the rigor of this study.²⁰ The framework for the integrative review methodology is as follows. First, the problem to be researched was clearly identified and defined. Second, a Boolean literature search was conducted across four databases (Cumulative Index to Nursing and Allied Health Literature [CINAHL], PubMed, Scopus, and Cochrane). The data were then evaluated and analyzed. Finally, the data were presented in a table of evidence and synthesized to form conclusions. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was also utilized to improve the clarity and transparency of this literature review²¹ (Fig. 1). This integrative review includes all the new studies published after the publication of the systematic review by Mohd Shukri et al. in 2018 investigating the effectiveness of relaxation interventions on breastfeeding outcomes.²²

Data sources

A Boolean literature search was conducted across CINAHL, PubMed, Scopus, and Cochrane using the keywords “Meditation OR meditate OR relaxation OR mindfulness” AND “Breast Feeding OR lactation.” Using this search strategy (see Table 1), 90 articles were identified. After removing duplicates, 55 articles remained. PRISMA guidelines were followed throughout this phase of the literature review.²¹

Operational definitions

The following terms are key concepts in this article, and they were defined as such.

Mindfulness. A state of heightened awareness achieved through a diverse number of mind–body practices with a common objective of concentrating on the interaction between the body’s physical sensations and the mind. It is the practice of intentionally paying attention to one’s present-moment experiences without evaluation. The goal of practicing mindfulness interventions is to modify the neuro-immuno-endocrine system to improve health and overall well-being.

Meditation. Meditation is a type of mind–body practice in which an intentional focus and open attitude are developed to decrease intruding thoughts about the past or future. The objective was to focus the mind and train attention and awareness to achieve a mentally clear and emotionally calm and stable state. There are many forms of meditation, such as focused attention, open monitoring, and automatic self-transcendence. These techniques all typically use a quiet and relaxing setting and a still and comfortable position.

Relaxation techniques. Relaxation techniques are cognitively based techniques designed to decrease both psychological and physiological stress. These techniques include deep breathing, guided imagery, progressive muscle relaxation, meditation, yoga, and light therapy, whereby certain hues of light are used to influence mood.

Screening and inclusion criteria

The articles’ abstracts were initially reviewed and if they met inclusion and relevance criteria, a full-text screening was then completed. Articles were included if they were published between January 2013 and January 2023, written in English, and discussed the effects of mindfulness relaxation techniques on human lactation.

Of the 55 articles, 7 were removed as they are currently ongoing studies without results. Six other studies were excluded because they were published over 10 years ago, whereas three other studies were about lactation, but had little discussion of mindfulness. Three more studies were excluded owing to wrong outcomes measured, two had the wrong intervention, and three had the wrong study design. Moreover, two articles were excluded due to containing only an abstract without a full study following. Finally, two other articles were excluded because they were the preprint version of studies that were included in this review. Nine articles overall met the criteria for inclusion and are discussed in this review.

Analytic strategy

The framework developed by Melnyk and Fineout-Overholt²³ for determining an article’s level of evidence was used to score the nine articles. The analytic strategy utilized in this review consisted of initially extracting methodological data from the articles. This included extracting data relating to the study locations and populations, methods of data collection, interventions, and outcomes. The extracted data was organized into a table of evidence which allowed for comparison and categorization to ultimately identify themes (Table 2).

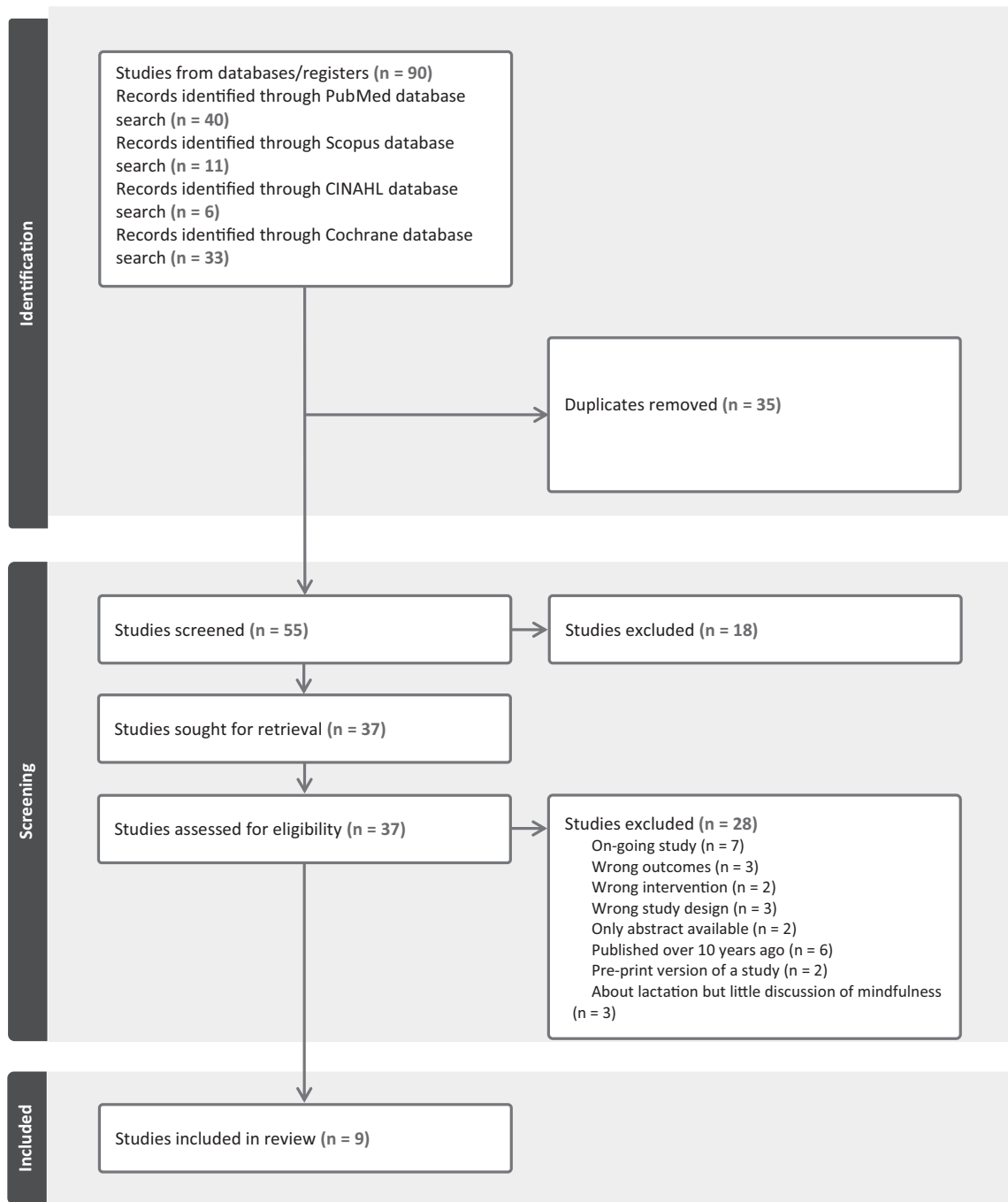


FIG. 1. PRISMA flowchart. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

TABLE 1. SEARCH STRATEGY

<i>No. search strategy</i>	<i>MeSH</i>	<i>Keywords</i>
(1) MeSH or keywords (key findings for breastfeeding)	Breastfeeding, breastfeed, lactation, lactate	Breastfeeding or “breast feeding” or breastfed or lactation or lactate
(2) MeSH or keywords (key findings for mindfulness interventions)	Meditation, meditate, mindfulness, relaxation	Meditation or mindfulness or relaxation
(3) 1 and 2 (combination of both key findings)	(Breastfeeding, breastfeed, lactation, lactate) or [(breastfeeding or “breast feeding” or breastfed) or (lactation or lactate)] and (meditation, meditate, mindfulness, and relaxation)	

MeSH, Medical Subject Headings.

TABLE 2. ARTICLE SUMMARY

Author (year)	Article type and Mehtyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Mohd Shukri et al. (2018)	Systematic review; I	No specific region	A literature search was performed using the PRISMA guidelines to evaluate the effectiveness of interventions using relaxation therapy to improve breastfeeding outcomes and to assess the consequent impacts on infant growth and behavior	N/A	N/A	The major findings were that there are few studies testing the hypothesis that the breastfeeding process could be improved by reducing maternal psychological distress or stimulating let-down-reflex by using relaxation. Two RCTs have shown that relaxation therapy improved milk supply, but overall evidence is inconclusive owing to methodological limitations
Dabas et al. (2019)	Nonblinded RCT; II	Level-III NICU at AIMS Hospital in New Delhi, India; From a total of 160 admissions over 6 months, 74 postpartum mothers met the inclusion criteria whose neonates were born preterm (26–33 weeks gestation) and admitted consecutively. 57 mothers agreed to participate, and they were enrolled and randomly assigned to experimental ($n=29$) and control ($n=28$)	Mothers who met the inclusion criteria (singleton pregnancy, ability to understand Hindi or English, no previous NICU experiences, no neonates with major congenital anomalies or on any psychotropic drugs) were randomized into experimental and control group on 4 ± 2 postpartum day. Total enumeration sampling technique was used. Baseline data collection was done using pre-tested demographic sheet and standardized Parental Stress Scale: NICU (PSS:NICU)	Relaxation technique was demonstrated and administered to postpartum mothers of the experimental group on the day of enrollment by yoga therapist and researcher. The audio-assisted relaxation technique was 30 minutes, developed under the guidance of yoga therapist, which included deep breathing (5 minutes), Suksham Vyayam (8 minutes), Anulom-Vilom (5 minutes), Brahmari (5 minutes), PMR (5 minutes), and deep breathing	The participants all were required to understand either Hindi or English. Race and ethnicity were not reported. Age, marital status, education level, occupation, type of family, residential area, and monthly family incomes were reported. The mean age was 30 ± 3.8 years in the experimental group and 29 ± 3.9 years in the control group. All the participants were married. The majority of participants had a	There was significant improvement observed in the mean stress score of postpartum mothers in the experimental group in the domains of sight and sound, baby look and behavior, parent role alteration and total stress scores in comparison with control group. However, significant difference in parent role alteration was also observed in the control group. Significant improvement in the mean anxiety scores of postpartum mothers in experimental group was observed compared with the

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TABLE 2. (CONTINUED)

Author (year)	Article type and Melnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Demirci et al. (2016)	Pilot feasibility study; VI	United States; 183 postpartum women who delivered between 34 and 37 weeks of	<p>scale, and PASS, which are standardized self-reported scales to measure the mothers' stress and anxiety. Postintervention data on maternal stress and anxiety and milk output were collected after 10 days of the enrolment of the mothers. The mean milk output was measured as the volume expressed using electric breast pump till the complete emptying of both breasts in 24 hours divided by frequency of milk expression by the mother.</p> <p>Data were coded and summarized and analyzed using STATA 14.0 version and presented in percentage, mean, standard deviation, and range. The independent <i>t</i>-test, paired <i>t</i>-test, and Fisher's exact test were used to compare variables between and within the groups. The level of significance was set at <i>p</i>-value <0.05</p> <p>Women meeting eligibility criteria (must be currently providing breast milk, intention to breastfeed exclusively</p>	<p>(2 minutes). Relaxation technique was played on laptop in a quite isolated room of the postnatal ward between 6:00 and 6:30 p.m. and postpartum mothers follow the instruction in small group in sitting position on chair under the supervision of researcher for 10 consecutive days. During the same period, the control group continued to receive the routine care</p>	<p>graduate level of education or above. The type of family was split between joint and nuclear. The majority of participants lived in urban areas as compared with rural areas. The majority of participants had a monthly income between 10,001 and 20,000 rupees</p>	<p>control group (19.8±6.7 versus 28.18±11.7, <i>p</i>≤0.05) following the intervention. Similarly within the experimental group a significant reduction in the mean anxiety scores (31.12±11.4 versus 19.8±6.7, <i>p</i>=0.001) was observed following the intervention. Statistically significant difference in milk output of postpartum mothers of experimental and control group (69.2±19.3 versus 54.1±22.5, <i>p</i>≤0.01) was also observed</p>
				<p>The intervention aspect of the study occurred over 9 days where women received either a meditation</p>	<p>Demographic data included race, age, marital status, and education level. All the participants</p>	<p>Mothers of late preterm or early-term infants with perceptions of insufficient milk supply found the</p>

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TABLE 2. (CONTINUED)

Article type and Melnik and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
	<p>gestation and intended to breastfeed for at least 2 months were approached during their postpartum hospitalization at a large regional obstetrical hospital or referred from a community-based primary care pediatric clinic. Of 183 women screened, 11 were eligible, enrolled into, and completed the 9-day trial. Six were randomized to the herbal supplement and 5 to meditation</p>	<p>for at least 2 months, and absence of conditions with potential to affect milk supply) were randomized to receive a meditation intervention or an herbal supplement. Computer-generated block randomization was used to ensure near-equal allocation to each group. Women recorded study use intervention and side-effects, infant feeding (proportion of breast milk feeds, volume of expressed milk), and concern about milk supply daily on an investigator-created 7-point Likert scale. The women also completed pre- and postintervention test weights to measure volume interventions. Mothers recorded prefeed and postfeed weights on study days 1–2 (preintervention) and 8–9 (postintervention), two times per day, when milk supply was perceived as being most abundant. Mothers who also pumped/expressed breast milk recorded volume of expressed milk two times per day.</p>	<p>intervention on an MP3 player or a commercially available herbal supplement (Motherlove: More Milk Plus Alcohol Free). Participants also received three home visits with a lactation consultant, which included infant weight measurement and breastfeeding assistance. Mothers randomized to the meditation intervention received three guided meditations modeled on mindfulness-based stress reduction and recorded by a study investigator trained in the technique. The meditations were 5–8 minutes each and included a guided-imagery recording specific to breastfeeding, a guided thankfulness meditation, and a guided relaxation. Participants were instructed to listen to the meditations of their choice at least twice each day, preferable when breastfeeding or expressing breast milk</p>	<p>identified as non-Hispanic, and 73% identified as White, 2% as Black, and 1% as ‘Other’ race. Participants ranged in age from 23 to 35 years. All the participants were at least high-school graduates, with 4 college graduates. 6 participants were married, 4 were living with partners, and 1 was single</p>	<p>complementary alternative medicine interventions used to be acceptable, safe, and potentially beneficial for increasing milk supply (herbal supplement) and/or promoting an overall sense of well-being (meditation). Although the women were not convinced of the effect of the tested CAM interventions on actual milk supply, the participants noted alternate benefits including relaxation. The women indicated that a longer observation period with CAM would result in improved perception of milk supply</p>

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TABLE 2. (CONTINUED)

Author (year)	Article type and Melnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Dib et al. (2022)	RCT; II	Mothers of healthy infants of 34–38 gestational weeks were identified and screened before being discharged from three hospitals (Royal Free, Barnet, and University College London Hospitals) in London. 183 participants were assessed for eligibility and 72 were randomized with 37 allocated to the control group and 35 allocated to intervention	Women were called at 2 months to assess feeding status. Audio-recorded qualitative interviews were transcribed verbatim and a content analysis, utilizing Atlas.ti software v.6.2 was conducted to identify major themes regarding perceptions of the interventions. Summary statistics were calculated for quantitative data using SPSS v.21	Eligible mothers (singleton pregnancy, intended to breastfeed for at least 6 weeks, spoke and understood English, did not smoke, were free of serious illness, and did not have a prior breast surgery that could interfere with breastfeeding) were randomly allocated to either the intervention group or the control group (no intervention given). Mothers in the intervention group were given a breastfeeding meditation recording and instructed to listen to it during	Demographic data included maternal age, ethnicity, education, marital status, and household income. The mean maternal age was 33.1 ± 4.9 years. 38% of participants identified as White, 2% were Mixed/Multiple ethnic groups, 11% were Black/African/Caribbean/Black British, 12% were Asian/Asian British, 3% were Arab, and 3% were “Other ethnic group.” Approximately 50% of the participants had at the minimum	The change in weight-for-age Z-score was significantly higher in the intervention group compared with the control group (effect size: 0.4 Z-scores; 95% CI: 0.09 to 0.71), but the change in stress score over the 4 weeks was not significantly different (effect size: -0.2, 95% CI: -2.8 to 2.4). There were no significant differences between groups in stress score (effect size: -1.7; 95% CI: -4.3 to 0.9; Table 3) or depression (effect size: -0.3; 95% CI: -2.4 to 1.8) at 6–8 weeks. Attachment and responsiveness to cues

(continued)

TABLE 2. (CONTINUED)

Article type and Metnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Author (year)		adiponectin), milk volume assessed by 48-hour test weighing, and maternal engagement with the infant. Infant behavior, including crying and sleeping, and infant appetite was also measured. Data about mediators such as maternal perception of milk supply and salivary oxytocin were collected as well Participants completed the Edinburgh Postnatal Depression Scale, Maternal Responsiveness Questionnaire, Maternal Attachment Index, and Baby Eating Behavior Questionnaire.	breastfeeding or pumping. The audio used was 11 minutes in duration and was adapted to suit the current population. Mothers were encouraged to use it as many times as they would like, but at least once a day for the first 2 weeks starting at 2–3 weeks postdelivery. Mothers were asked to keep track of the frequency and dates the meditation audio was used in provided listening logs	completed a bachelor's degree. Over 50% of participants were married/civil partnership/cohabitation. The level of household income ranged from £20 to 30K, £45–75 K, <£100K, and >£100K. 25% of participants fell into each income category, so the range of incomes was split evenly	were also not different between groups. There were no significant differences in cortisol levels between groups (RG: 0.18 ± 0.07 versus CG: 0.16 ± 0.08 ; $p = 0.5$). However, cortisol increased over time in the CG and decreased in the RG, and this change was significantly different (effect size: -0.08 $\mu\text{g/dL}$, 95% CI: -0.15 to -0.01). Verbal learning was also significantly higher (i.e., better) in the RG compared with the CG at 6–8 weeks (effect size: 1.1 words, 95% CI: 0.04 to 2.1). In the infants, there were no significant differences at 6–8 weeks in weight z-score, length z-score (CG: 1.1 ± 1.3 , $n = 27$ versus RG: 1.2 ± 1.0 , $n = 28$; $p = 0.9$), or change in length z-score (CG: 0.5 ± 0.8 , $n = 27$ versus RG: 0.3 ± 0.9 , $n = 28$; $p = 0.4$) between groups. Median infant crying duration was significantly shorter in the RG compared with the CG [RG: 5.0 minutes, 0.0–120.0

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TABLE 2. (CONTINUED)

Article type and Melnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Karbandi et al. (2017)	Mothers of preterm infants of a gestational age between 32 and 36 weeks who were hospitalized at one of the education, research, and treatment centers of Ghaem, Imam Reza, and Omolbanin, Mashhad. There were	A clinical trial approach was used. The Dennis breastfeeding self- efficacy standard questionnaire, a demographic information form, and a relaxation self-report checklist were used as the research tool	The intervention consisted of a researcher giving each participant (in the intervention group) a one-to-one PMR training session (30–45 minutes) in accordance with the Jacobson method in the break room. After ensuring that the participants	Race and ethnicity were not reported in this study. The mean age of participants in the intervention group was 28.2 ± 6.7 years and 27.8 ± 5.5 years in the control group. The participants all had at least an elementary education level with the	versus CG: 30.0 minutes, 0.0–142.0; $p = 0.03$] at 6–8 weeks. No significant differences were found in any other behavior or appetite trait (all $p > 0.05$). These analyses were limited by the small number of participants completing the behavior diaries especially in the CG (55% of RG, 36% of CG). Mothers in the RG breastfed significantly more times per day compared with those in the CG (effect size: 3.9; 95% CI: 0.9 to 6.9; $p = 0.01$). There were no significant differences in fat, protein and carbohydrate concentrations in breast milk or in estimated breast milk intake between groups An independent t -test found no significant difference between the mean score of self- efficacy for the two groups at pretest ($p = 0.45$). However, the mean scores of self- efficacy at the first pretest (fourth postpartum week; $p = 0.001$) and second

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TABLE 2. (CONTINUED)

Author (year)	Article type and Mehtnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
		a total of 60 mothers in the study, and they were randomly assigned to either the intervention or control group		were sufficiently proficient in performing the PMR routine, the participants were given an audio CD of the training routine, a written guide for performing the routine, and a self-report checklist with the researcher's telephone number. The participants were requested to perform the routine at least once each day and to record the date and time of each performance on the checklist. The participants returned to the centers during the 4th and 8th postpartum weeks to complete the breastfeeding self-efficacy questionnaire	majority of them having completed high school. Income level was reported as "poor," "good," or "excellent." The mode income level was poor, and this was followed by good	pretest (eighth postpartum week; $p < 0.001$) were significantly higher in the intervention group than in the control group. Furthermore, the analysis of variance test found that mean self-efficacy scores for the intervention group differed significantly over time ($p < 0.001$), whereas mean self-efficacy scores for the control group did not differ significantly over time ($p = 0.16$). The relaxing training program effectively improved breastfeeding self-efficacy of mothers with premature infants
Massa et al. (2022)	RCT; II	United States; mothers were recruited within 48 hours after delivery if delivery occurred between gestational ages of 24–32 weeks. 156 mothers were assessed for eligibility, and 70 were randomized. Ultimately, 26 women were in the	The primary outcome was the mean total volume of expressed milk in 24 hours on the infant's 9th day of life. Participants were asked to complete a record of the number of pumping sessions during this 24-hour timeframe and the amount of milk expressed during each session. The secondary	The intervention consisted of providing mothers in the intervention group with free access to the Expectful app at the time of randomization. Starting on the day of enrollment through the infant's ninth day of life, women in the meditation group were asked to engage in	The mean age was 27.3 ± 6.1 years in the intervention group and 28.5 ± 6.9 years in the control group. Race/ethnic identity was split evenly between Black and White with ~50% of participants identifying as Black and the other half as White. 31% of the	At the infant's ninth day of life, breast milk production of mothers of preterm infants randomized to daily use of a meditation app was similar to women receiving routine lactation support. Once adjustment for potential confounders in the per protocol analysis was done, a significant

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TABLE 2. (CONTINUED)

Article type and Melnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
	meditation (intervention group) and 28 women were in the control group	outcomes included measures of maternal mental health including depression by the Edinburgh Postnatal Depression Scale (EPDS), anxiety by the STAI, parental stress in relation to having an infant in the NICU by the Perceived Stress Scale: NICU (PSS- NICU), and breastfeeding self- efficacy by the Breastfeeding Self Efficacy Scale: Short Form with Additional Questions for Critically Ill Infants (BSES-SF- NICU). This assessment occurred between the infant's 10th and 16th DOL. Other secondary outcomes were the continuation of providing breast milk at the 28th DOL and use of lactation-promoting behaviors: skin-to-skin contact, frequent pumping, and use of hand expression with pumping, which were obtained by self-report from participants	daily use of Expectful, a mindfulness-focused meditation app made specifically for pregnancy and motherhood. The Expectful app offers 5 to 20 minutes of guided meditations tailored particularly to the experiences of postpartum women. Women in the meditation group were offered help in downloading and navigating the app and recommendations to choose relevant meditations (i.e., focused on breastfeeding or postpartum healing). Participants were encouraged to select meditations lasting the full duration of pumping and to minimize distractions. Women in the meditation group were also provided with routine lactation support and had access to the Expectful app through their infant's 28th day of life	intervention group participants were married and 38.7% of the control group were married. Approximately 40% of participants (the mode income of annual income of \$10,000–49,999/ year. 29% of participants had an annual income of <\$10,000/year. Approximately 65% of participants had at least completed college or attended some college. 44.8% of the intervention group participants had private insurance, whereas 64.5% of the control group had private insurance	increase in breast milk production, pumping frequency, and skin-to- skin contact and a decrease in clinically significant depression symptoms among a subset of mothers who engaged in meditation for at least seven occasions was found

(continued)

TABLE 2. (CONTINUED)

Author (year)	Article type and Mehtnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
Mohd Shukri et al. (2019)	Randomized control trial; II	Healthy first-time mothers (free from serious illness, not on medication, and nonsmokers) were recruited during their third trimester from antenatal clinics in Klang Valley, Malaysia. Those who delivered healthy full-term infants with birth weight >2.5 kg and were exclusively breastfeeding were randomly assigned to receive relaxation therapy (intervention $n = 33$ and control group $n = 31$)	Maternal psychological state, breastfeeding practices and infant behavior was assessed using validated questionnaires. Milk volume was measured using stable isotopes. Breast milk samples were collected to measure macronutrient content and hormone levels. Anthropometric measurements (weight, length and head circumference) were performed during all home visits, including body composition at week 14	Mothers randomized to the intervention group were provided with a relaxation therapy audio recording to listen to while breastfeeding during each home visit session, and during the subsequent 2 weeks after each home visit. After each home visit, the intervention group mothers were asked to listen to the therapy daily while breastfeeding or expressing milk for at least 2 weeks. They were also encouraged to listen beyond 2 weeks as frequently as they found useful throughout the trial and to record in a diary when it was used. The duration of the intervention was 12 weeks	Approximately 100% of the participants were of Malay ethnicity. 33% of participants were between 20 and 25 years old, 59% of participants were 26–30 years old, and 8% were between 31 and 34 years old. 100% of participants were married. 61% of participants had at least a bachelor's degree. Income was measured in RM. 30% of participants had an income between 1500 and 3000 RM, 25% had an income between 3001 and 5000 RM, and 30% had an income between 5001 and 8000 RM. 9% had an income of 8001–10,000 RM and the remaining 6% had an income of greater than 10,000 RM	The effects of the intervention were reduced stress levels in mothers and higher weight gain and BMI in their infants. The intervention therapy also had significant effects on infant behavior with increased sleeping duration at 6–8 weeks of age, and a greater reduction in milk cortisol concentrations during a feed when the mother was first exposed to the therapy
Yu et al. (2022)	Single-blind RCT; II	China; 96 healthy Chinese primiparous mother–infant pairs after late preterm or early-term delivery (34–37 gestations weeks) were recruited	Anthropometry assessments of mother and infants were conducted following standard procedures provided by WHO. Weight and recumbent length of infants were measured using an electronic infant weight and length scale	The intervention was a relaxation meditation CD designed for breastfeeding mothers. Mothers in the intervention group were given the relaxation meditation recording by scanning a QR code. They were asked to listen to the	54% of the participants in the intervention group and 56% of the participants in the control group were between 26 and 30 years old. 100% of the participants were married. Over 50% of participants had attained at least a	A significant dose–response reduction in maternal postpartum stress was observed in intervention group mothers. Intervention group infants showed significantly greater weight gain from 1 to 8 weeks calculated using both Intergrowth

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TABLE 2. (CONTINUED)

Article type and Melnyk and Fineout-Overholt level of evidence grade	Location, population	Methods	Interventions	Demographics	Outcomes or conclusions
<p><i>Article type and Melnyk and Fineout-Overholt level of evidence grade</i></p>	<p><i>Location, population</i></p>	<p><i>Methods</i></p>	<p><i>Interventions</i></p>	<p><i>Demographics</i></p>	<p><i>Outcomes or conclusions</i></p>
		<p>(Betterren-FSG-25-YE). Each measure was repeated 3 times and the mean value used. Infant anthropometric data were converted to SDS based on 21st Intergrowth data to standardize infant weight and length for age and sex. Maternal stress, anxiety, feeding attitudes, and infant eating behaviors were assessed using Perceived Stress Scale (PSS), Beck Anxiety Inventory, Baby Eating Behavior Questionnaire, and IIFAS, respectively. Infant behavior was assessed using a 3-day infant behavior diary. This consists of a “time ruler” for 72 hours, which is divided into 15-minute segments and has the following 6 categories of behavior: sleeping, awake and content, fussy, crying, colic, and feeding—with a definition of each behavior provided. The 24-hour milk intake was estimated using the 48-hour test weighing method; the final intake value was obtained after increasing the calculated value by 5% to consider insensible water losses</p>	<p>recording as frequently as possible while breastfeeding or expressing milk, preferably at least once a day. In addition, they were asked to record their use of the tape in a diary</p>	<p>bachelor’s degree. Approximately 40% of participants had annual income of <200,000 Chinese Yuan. 90% of participants gave birth at a public hospital, and the remaining 10% gave birth at a private hospital</p>	<p>and WHO references, with a dose-response effect using the WHO standards and a trend for a greater length gain. No significant differences were observed for secondary outcomes (breast milk energy content, macronutrient composition, maternal breastfeeding attitudes, and infant eating behaviors). The nonsignificant trend for higher breast milk fat and energy in intervention group mothers may reflect the collection of foremilk rather than that of hindmilk. Found no significant difference in infant behaviors in this study despite a longer sleeping and shorter “distress” duration in the intervention group. However, these analyses had limited power owing to poor compliance with the dairies</p>

(continued)

TABLE 2. (CONTINUED)

<i>Author (year)</i>	<i>Article type and Melnyk and Fineout-Overholt level of evidence grade</i>	<i>Location, population</i>	<i>Methods</i>	<i>Interventions</i>	<i>Demographics</i>	<i>Outcomes or conclusions</i>
Yu et al. (2019)	RCT; II	Local community clinic attached to Beijing Children Hospital in China; 20 primiparous mothers who were breastfeeding were enrolled in the study	Heart rate, SBP and DBP, fingertip temperature. Perceived relaxation was assessed by a visual analog scale	The study participants attended 6 treatment sessions in randomized order: relaxation meditation tape, music tape, relaxation light, combined meditation tape+lighting, and combined music+lighting, and a control session with no intervention	The mean maternal age was 32.2±3.3 years old. No other demographic data were reported	All five relaxation interventions had significant effects with increased fingertip temperature and perceived relaxation in Chinese mothers who are currently breastfeeding their infants. A significant reduction in blood pressure and heart rate was also observed following the meditation tape, the meditation tape+lighting, and music+lighting treatments. The meditation recording produced significant changes in all measured outcomes and resulted in the greatest change in SBP, DBP, and HR whereas the music+lighting intervention showed the greatest mean change in fingertip temperature and perceived relaxation. Four participants experienced the let-down reflex during the meditation recording session, but not during other

BMI, body mass index; CAM, complementary and alternative medicine; CD, compact disc; CG, control group; CI, confidence interval; DBP, diastolic blood pressure; DOL, day of life; HR, heart rate; IIFA, Iowa Infant Feeding Attitude Scale; NICU, neonatal intensive care unit; PASS, Perinatal Anxiety Screening Scale; PMR, Progressive Muscle Relaxation; PSS, perceived stress scale; RCT, randomized controlled trial; RG, intervention group; RM, Malaysian Ringgit; SBP, systolic blood pressure; STAI, State-Trait Anxiety Inventory; WHO, World Health Organization.

Results

Study characteristics

Studies included were published between 2013 and 2023. Samples were derived from six countries (two studies from China, one from Malaysia, two from the United States, one from Iran, one from the United Kingdom, and one from India). Of the included studies, six were randomized controlled trials (RCTs), which is Level II evidence.²³ Within these RCTs, four were double-blinded, one was single-blinded, and one was nonblinded. The other three included studies in this review consisted of a systematic review (Level I), a clinical trial with a control group (Level IV), and a pilot feasibility study (Level VI).²³

Demographics

Four studies reported the race and ethnicity of the participants. Of the studies that reported race/ethnicity, the sample populations were for the most part homogenous. For example, in one study, 73% of participants identified as White,²⁴ and in another study 100% of the participants identified as Malay.²² However, the study with the most heterogeneous population included different subgroups within race/ethnicity, which could also explain the heterogeneity of their sample.¹³

Household income was reported in six of the included studies. Income was one of the demographic areas that had more variation among participants as compared with other demographic data. This heterogeneity could be owing to the fact that levels of income were reported as broad ranges, thus allowing the data to appear more evenly distributed than it may be in reality. Conversely, marital status (reported in six studies) was found to be an extremely homogeneous area with the vast majority of participants being either married or cohabitating with a partner.

Seven of the studies had data on the education level of the participants. Across five of the studies that reported education level, the participants homogeneously had high levels of education with >50% of them having completed at least a bachelor's degree.^{13-15,17,18}

Additional demographic data included the age of the participants, which was reported in eight studies. One study looked at participants' use of private versus public insurance where it was found that half of the participants used private insurance and the other half had public insurance.¹⁷ Another study reported whether participants gave birth at a private or a public hospital (90% gave birth at a public hospital).¹⁸ Finally, one study looked at whether the participants lived in urban or rural areas with most of them residing in urban areas.¹⁵

Key themes identified

After synthesizing the information contained in the selected articles, six major themes relating to the relationship between mindfulness techniques and lactation emerged. The themes are as follows:

- (1) Mindfulness techniques decrease maternal stress, anxiety, and cortisol.
- (2) Mindfulness interventions impact human milk volume, expression, and breastfeeding frequency.

- (3) Mindfulness techniques influence infant behavior.
- (4) Mindfulness techniques influence infant growth.
- (5) Mindfulness techniques are effective, simple, and easily implementable tools.
- (6) Mindfulness techniques have dose and duration-dependent effects.

The themes and their supporting evidence were organized as given in Table 3.

Mindfulness techniques can decrease maternal stress, anxiety, and cortisol

The first key theme was that the use of mindfulness techniques (yoga-assisted relaxation and audio meditation recordings) has been found to be effective in reducing both perceived and physiological markers of stress and anxiety in lactating postpartum mothers.^{13-15,18,19,24} Furthermore, maternal cortisol, a biomarker of stress, and milk cortisol concentrations were also found to be decreased in conjunction with the utilization of mindfulness techniques.^{13,14} One study that compared different mindfulness techniques (meditation, music, or relaxation light) found that meditation was the most effective at reducing both perceived and physiological markers of stress in breastfeeding mothers.¹⁹ Another study found that mothers who engaged in frequent meditation had a clinically significant decrease in depression symptoms.¹⁷

Impact of mindfulness interventions on human milk volume, expression, and breastfeeding frequency

Second, it was noted in several articles that the use of mindfulness techniques increased human milk output.^{14,15,17} Breastfeeding frequency and pumping episodes were also associated with frequent meditation.^{13,17} Moreover, relaxation techniques were found to improve the success of milk expression, particularly in mothers of preterm infants.¹⁵ In the study that measured the effectiveness of different mindfulness techniques, four participants experienced the let-down reflex during the meditation recording session.¹⁹

Influence of mindfulness techniques on infant behavior

Many of the studies investigated the effects of the mindfulness techniques on improvements in infant behavior and found a positive association between the two.^{13-15,18} Infant crying duration was found to be significantly shorter when the infants' mothers were in the meditation intervention group as compared with the control group.¹³ Improvements in infant sleeping duration were also found across multiple studies.^{14,18}

Mindfulness interventions improve infant growth

Infant weight gain was promoted through the use of mindfulness interventions, particularly in late preterm and early-term infants.^{13,18} Late preterm and early-term infants exact nutrient requirements and optimal growth patterns are not as well-known as compared with infants born at lower gestation ages²⁵; therefore, it was interesting to note that infants in the mindfulness intervention group had significantly higher growth velocity despite the lack of direct nutritional intervention.¹³ Another study found that infants in

TABLE 3. EVIDENCE SUPPORTING THE SIX KEY THEMES

<i>Theme</i>	<i>Paper</i>	<i>Evidence</i>
Mindfulness techniques decrease maternal stress, anxiety, and cortisol	(1) Dabas et al. ¹⁵	(1) A significant reduction in maternal stress and anxiety scores was measured in the intervention group
	(2) Demirci et al. ²⁴	(2) Mothers of late preterm or early term infants endorsing a milk supply problem found that meditation promoted an overall sense of well-being
	(3) Dib et al. ¹³	(3) The relaxation intervention favorably affected stress since cortisol, a biomarker of stress, was significantly decreased in intervention group mothers
	(4) Massa et al. ¹⁷	(4) When adjusting for mood or anxiety disorders, a significant decrease in the odds of a clinically significant Edinburgh Postnatal Depression Scale score of >9 was found in the per-protocol intervention group
	(5) Mohd Shukri et al. ¹⁴	(5) Relaxation group participants had significantly lower stress scores at both later timepoints (home visits 2–4 weeks apart). Intervention group participants had significantly lower cortisol concentrations in hindmilk compared with control group
	(6) Yu et al. ¹⁸	(6) Intervention group participants experienced a significantly greater reduction in maternal perceived stress.
	(7) Yu et al. ¹⁹	(7) Relaxation techniques (meditation, music, and light therapy) reduce both perceived and physiological markers of stress with meditation being the most effective technique compared with the control state. Decreased physiological markers of stress include reduced blood pressure, heart rate, and increased fingertip temperature
Mindfulness interventions impact human milk volume, expression, and breastfeeding frequency	(1) Dabas et al. ¹⁵	(1) A significant improvement in milk output was measured in the experimental group as compared with the control group
	(2) Dib et al. ¹³	(2) Breastfeeding frequency among mothers in the intervention group was increased in comparison with control group
	(3) Massa et al. ¹⁷	(3) In women who participated in at least seven meditation sessions, an increase in breast milk production and an increase in the number of pumping episodes occurred
	(4) Mohd Shukri et al. ¹⁴	(4) The relaxation group experienced higher milk volume and a higher in milk intake compared to control
	(5) Yu et al. ¹⁹	(5) Four participants, with infants aged 1–3 months, experienced milk let-down during the meditation session
Mindfulness techniques influence infant behavior	(1) Dabas et al. ¹⁵	(1) There was a significant improvement observed in the experimental groups' baby look and behavior
	(2) Dib et al. ¹³	(2) Infants (late preterm and early-term infants) of the intervention group mothers had decreased crying duration and improved verbal learning
	(3) Mohd Shukri et al. ¹⁴	(3) Relaxation group infants had significantly longer sleep duration than control group infants
	(4) Yu et al. ¹⁸	(4) A longer sleeping and shorter distress duration was found in intervention group infants. However, this analysis has limited power because of poor participant compliance with data recording in diaries
Mindfulness techniques influence infant growth	(1) Dib et al. ¹³	(1) The relaxation intervention was successful in improving infant growth shown by significantly higher and clinically meaningful weight-for-age z-score gain
	(2) Mohd Shukri et al. ¹⁴	(2) Relaxation group infants had significantly higher weight and BMI SDS than control group infants
	(3) Yu et al. ¹⁸	(3) Intervention group infants showed a significantly greater weight gain from 1 to 8 weeks calculated using both Intergrowth and WHO references, with a dose–response effect using the WHO standards and a trend for a greater length gain
Mindfulness techniques are effective, simple, and easily implementable tools	(1) Dabas et al. ¹⁵	(1) The use of audio-assisted relaxation techniques should be used routinely for postpartum mothers of hospitalized neonates and can be considered an integral part of neonatal care in the NICU

(continued)

TABLE 3. (CONTINUED)

<i>Theme</i>	<i>Paper</i>	<i>Evidence</i>
	(2) Dib et al. ¹³	(2) Relaxation interventions are simple tools that should be considered for clinical use, particularly when the lactating person experiences high levels of stress or anxiety and when there is concern about infant growth
	(3) Karbandi et al. ¹⁶	(3) Relaxation training is an effective and low-cost method that can improve the health of breastfeeding people and particularly affects those with preterm infants. PMR helps to facilitate the self-efficacy of breastfeeding in mothers with preterm infants
	(4) Mohd Shukri et al. ¹⁴	(4) The authors described the intervention tool as a simple and practical allowing it to be easily used in future interventions aimed at increasing rates and duration of breastfeeding
Mindfulness techniques have dose- and duration-dependent effects	(1) Dib et al. ¹³	(1) A positive and significant correlation was found between relaxation intervention use and weight z-score change, food responsiveness change and breastfeeding frequency. Intervention use was also negatively associated with infant crying duration
	(2) Massa et al. ¹⁷	(2) Higher frequency meditation is positively associated with increased milk volume and a reduction of depression symptoms
	(3) Yu et al. ¹⁸	(3) Greater use of the relaxation tape was associated with a greater reduction in maternal stress. A greater number of days of use was associated with a greater infant weight

the mindfulness intervention group, who were either within the expected weight and body mass index scores according to World Health Organization (WHO) growth standards or slightly below the 50th percentile, experienced a significantly higher weight gain from baseline to the study's endpoint.¹⁴ This increase in weight gain represented a close match to the optimal growth of breastfed infants, which suggests that the mindfulness intervention may allow the breastfed infants to achieve an ideal growth pattern more closely.¹⁴

Mindfulness techniques are an effective, simple, and easily implementable tool

The use of mindfulness techniques is an inexpensive method that can be easily implemented in multiple settings. Several studies advocated for the use of these techniques to be considered an integral part of neonatal care in the neonatal intensive care unit (NICU) as these are situations where high levels of stress and anxiety are experienced and there are concerns about infant growth as well as breastfeeding failure.^{13–15} Another study also noted that mindfulness training is an easy and low-cost skill that can improve breastfeeding self-efficacy in mothers with premature infants, which could be expected to then increase rates of successful breastfeeding.¹⁶ Furthermore, a study that examined the effectiveness of mindfulness interventions in healthy mother–infant dyads found that these techniques are simple and practical and could easily be used in future interventions aimed at increasing the rates and duration of breastfeeding.¹⁴

Dose- and duration-dependent effect of mindfulness techniques

Dose and duration of mindfulness interventions impacted their effectiveness. Dose refers to how many times the intervention was used, and it is measured in days. Duration is defined as the total amount of time spent using the mindful-

ness intervention, and it is measured in minutes. For instance, one study found that a greater duration, that is, an increased amount of time spent listening to a meditation tape, was associated with greater infant weight and that a larger dose, that is, number of days, of the meditation tape was associated with a more significant reduction in maternal stress.¹⁸ Another study analyzed the dose-dependent effect where the researchers encouraged participants to engage in the daily use of a mindfulness-focused meditation audio recording.¹⁷ The number of days the intervention was used was recorded as data.

It was found that mothers who meditated for at least 7 days (a minimum of one meditation session per day) experienced a 100% increase in skin-to-skin contact and that this higher frequency meditation was associated with increased milk volume, increased pumping sessions, and reduction of depression symptoms.¹⁷ Another study found positive and significant correlations between the frequency of use of a relaxation intervention and infant weight z-score change, food responsiveness change, and breastfeeding frequency.¹³ This study also found a negative correlation between the frequency of use of the intervention and infant crying duration.¹³

Discussion

In a previous systematic review published by Mohd Shukri et al. in 2018, relaxation interventions were shown to be effective in significantly increasing milk yield and fat content in human milk as well as reducing maternal stress.²² This integrative review synthesized research carried out on the use of mindfulness techniques and their effect on lactation and infant outcomes, and it reinforces earlier findings that these techniques do indeed have a positive impact. The utilization of mindfulness interventions, whether it be meditation, progressive muscle relaxation, or deep breathing therapy, promotes a reduction in both perceived and physiological stress

and anxiety in postpartum breastfeeding mothers. These interventions were also found to have a positive impact on infant growth and behavior, and these findings hold weight for both healthy mother–infant dyads as well as late preterm and early-term infants.

It is essential to note however that the effectiveness of these interventions depends on the frequency with which they are performed. In order for the mindfulness interventions to be successful, it is imperative that they be done regularly.^{17,18} Furthermore, in several studies, the mindfulness interventions were self-administered and self-reported,^{13,14,17,24} which means that some of the results where no significant difference was found in infant behaviors, maternal stress, milk volume, and composition could be owing to low adherence to the intervention protocol.^{17,18,22,24} In studies where the intervention was not self-administered or self-reported, significant reductions in stress, improvements in infant behavior, and increases in milk output were observed.^{15,19}

Furthermore, in the studies where the interventions were self-administered and self-reported, it is interesting to consider the reasoning behind why some mothers were using the techniques with a higher frequency. One study performed in Beijing China found greater use of the intervention by mothers of female infants, which could potentially explain the study's findings of significantly higher weight gain in the female intervention infants.¹⁸ This highlights the importance of exploring mothers' attitudes, beliefs, and customs to ensure the effectiveness of interventions.

The significantly positive impacts of the mindfulness interventions on reducing maternal stress were theorized in many of the studies to be linked to the effects on infant growth and behavior.^{13,14} Parent–offspring conflict theory could help explain this phenomenon from an evolutionary standpoint as mother–infant tension over metabolic resources could be improved by reducing maternal stress.²⁶ One study proposed that reducing maternal stress through mindfulness techniques could result in the transfer of maternal energy from stress to investment in the infant via breastfeeding, by allowing for increased transfer of human milk and/or by affecting the infant through human milk hormones.¹³ The hormones found in human milk can directly impact infant growth through the promotion of tissue growth, or indirectly by impacting infant behavior.²⁷

Another study also put forth the idea that the effects on infant behavior and growth may be owing to changes in human milk intake or composition as a result of the mindfulness interventions.¹⁴ Maternal stress serves as a physiologic signal and can impact human milk composition or volume. It was found that mothers with decreased stress because of mindfulness interventions produced milk with lower concentrations of cortisol and had more efficient or frequent milk ejection, which could affect infant behavior as well as influence nutrient intake.¹⁴ Psychological mother–infant signaling is evident in several studies because by experimentally manipulating the maternal psychological state through mindfulness interventions, effects on infant behavior and growth were observed.^{14,15,18} An explanation for this could be that by reducing maternal stress, mothers were able to spend better quality time bonding with their infants (for instance, increased skin-to-skin time), which could then facilitate improved infant sleep.

Moreover, the use of mindfulness interventions was found to be a safe, low-cost, and easily implementable tool for improving lactation outcomes.^{13–16} These interventions allow for flexibility and can be self-administered from any setting or performed by a trained professional in a clinic or outpatient setting. Their effectiveness in both low-risk healthy mother–infant dyads and in mothers with late preterm/early-term infants, or hospitalized infants illustrates that this is a therapy with the potential to be beneficial for all. Furthermore, owing to the high-stress levels experienced by mothers of hospitalized infants (or infants experiencing other health challenges), these interventions would be particularly helpful to prescribe as part of a holistic complementary aspect of neonatal care in the NICU.

Clinical implications

Based on the findings of this integrative review, mindfulness interventions may be beneficial to many parents of hospitalized infants. These interventions require minimal resources to implement; however, education and training of staff would be essential. From this review, it was also noted that interventions had better outcomes when there was continued follow-up with the parent. During the antenatal period, health care providers should teach parents about mindfulness interventions. For example, parents could be taught to pair pumping and/or breastfeeding sessions with listening to an audio-guided meditation. Because human milk rates at discharge for NICU infants remain suboptimal, incorporating mindfulness interventions may improve the lactation journey for parents with sick children. We encourage hospital staff to investigate ways that they can incorporate mindfulness interventions into their daily clinical practice.

Future research

There is a need for research that includes more diverse patient populations and takes specific care to include racial and ethnic data that are representative of the general population. Research protocols would be enhanced with well-described periods of intervention and objective measurements of their outcomes. Because only two studies examined milk composition, further research in this area is warranted. It is well known that when the breast is more effectively emptied, the fat composition of the milk is higher. Specific studies examining the impact of mindfulness on breast emptying and caloric density of the milk could hold promise for improving growth rates of infants cared for in the NICU.

Limitations

There are several limitations to this review. First, the author has undergone meditation training courses and has a current meditation practice, so it is possible that unconscious bias was introduced into the review process when identifying results.

Second, this is an integrative review, meaning that it uses data from various study designs. Although this can contribute to an enhanced understanding of the topic, it is also challenging to integrate findings from such a wide array of study designs, which leaves the possibility for error.²⁰

Furthermore, all the studies included in this review identified the issue of small sample sizes, which limits the

generalizability of their findings. Also, many of the studies had interventions that were self-administered and self-reported, and this resulted in low compliance, which could have affected the data. In addition, owing to the nature of the intervention, it was not possible to blind intervention group mothers, which could have influenced their expectations and affected outcomes.

Finally, not all the studies included demographic data pertaining to race and ethnicity, income, education level, and marital status. This could lead to potentially biased results that may not be generalizable or reflective of the general population.

Conclusions

Evidence suggests that the use of mindfulness intervention techniques positively impacts postpartum breastfeeding mothers and their infants. Mindfulness techniques, and meditation, are useful for decreasing maternal stress and anxiety and increasing milk output and ejection frequency as well as breastfeeding and/or pumping frequency. Consequently, this positively influences the infant's behavior and growth.

Although these techniques can be beneficial, their effectiveness depends on how frequently they are used. However, owing to the fact that they have a low cost of learning and performing, lack the need for special equipment, and are easily implemented, they should be considered for use both in the clinical setting and wherever possible. Because these tools improve breastfeeding self-efficacy, they could be utilized in other interventions aimed at increasing the rates and duration of breastfeeding. Moreover, nurses in the NICU could be trained in these techniques to render them an integral part of neonatal care. Ultimately, mindfulness intervention techniques could help achieve breastfeeding goals, ameliorate the lactation experience, and improve infant outcomes.

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Authors' Contributions

K.G.: Conceptualization, methodology, data curation, writing, investigation. D.S.: Supervision, writing—reviewing and editing.

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