

Review

Mindfulness based intervention reduce anxiety in labor

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A B S T R A C T

Keywords:
Mindfulness
Anxiety
Labor

Objective: To determine the effectiveness of mindfulness interventions on anxiety through a systematic review.

Method: Systematic review by searching articles through the PubMed, ProQuest, Science Direct, Wiley Library, Sage Journal, and Cochrane Library databases with publication years January 2012 to January 2022

Results: Eleven articles met the inclusion criteria covering several countries, including Canada 1 article, Egypt 1 article, Taiwan 1 article, Amsterdam 2 articles, Iran 1 article, Austria 1 article, San Francisco 1 article, Germany 1 article, Sweden 1 article, China 1 article, and Spain 1 article.

Conclusions: Management of anxiety about childbirth is important for pregnant women. Mindfulness interventions are effective for reducing anxiety about labor and increasing comfort during labor. Mindfulness intervention mechanisms have the potential to reduce anxiety by increasing skills to regulate emotions.

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Intervención basada en *mindfulness* para reducir la ansiedad en el parto

R E S U M E N

Palabras clave:
Mindfulness
Ansiedad
Parto

Objetivo: Determinar la efectividad de las intervenciones de *mindfulness* en la ansiedad, el dolor de parto y el resultado neonatal a través de una revisión sistemática.

Método: Revisión sistemática mediante búsqueda de artículos en las bases de datos PubMed, ProQuest, Science Direct, Wiley Library, Sage Journal y Cochrane Library entre enero de 2012 y enero de 2022.

Resultados: Once artículos cumplieron los criterios de inclusión, que corresponden a diversos países, incluyendo Canadá 1 artículo, Egipto 1 artículo, Taiwán 1 artículo, Ámsterdam 2 artículos, Irán 1 artículo, Austria 1 artículo, San Francisco 1 artículo, Alemania 1 artículo, Suecia 1 artículo, China 1 artículo y España 1 artículo.

Conclusiones: El manejo de la ansiedad debida al parto es importante para las gestantes. Las intervenciones de *mindfulness* son efectivas para reducir la ansiedad ante el trabajo de parto y aumentar la comodidad durante este. Los mecanismos de intervención de *mindfulness* tienen el potencial de reducir la ansiedad al aumentar las habilidades para regular las emociones.

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Introduction

Pregnancy is not only a physical reality, but related to individual thoughts and attitudes.¹ Increasing anxiety to the point of fear is a common problem related to childbirth.² Labor is a normal physiological event, where negative feelings such as aches and pains, fear, and anxiety are experienced by the mother during labor.³

Anxiety is associated with negative birth outcomes, which implies that pregnant women with anxiety have poor expectations of labor pain.⁴ Based on prevalence data anxiety has been reported to be 12.2-39% depending on the type of anxiety in pregnant women two or three times higher than the general

population.⁵ Approximately 14.5% of women experience anxiety, 9.4% experience moderate anxiety and 8.7% experience severe anxiety during childbirth.⁶ The incidence of anxiety in Indonesia reaches 373,000,000 or 28.7% one of them related to anxiety about childbirth. Every day 810 pregnant women die from complications related to pregnancy or childbirth. About 295,000 women die during and after pregnancy and childbirth. The main causes of death in women during pregnancy, childbirth and the puerperium are complications. Almost all complications develop during pregnancy. Approximately 80% of the causes of complications in the mother are bleeding, infection, hypertension during pregnancy (preeclampsia and eclampsia), and unsafe abortion. Maternal health and newborn baby are related. About 2.5 million children die in the first month of life, and about 2.6 million babies are stillborn.

Maternal anxiety that is not treated properly can cause great risk to both mother and fetus and can affect quality of life.⁷

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Anxiety will increase pain or pain during labor such as prolonged parturition which can increase the risk of interference with the fetus, head compression, fetal death, low Apgar score, injury to the neonate, risk for fetal growth, early miscarriage, low birth weight, and premature labor.⁸ Excessive anxiety that causes depression can increase the risk of complications during pregnancy and childbirth such as preeclampsia in the mother, postpartum depression and various other health complications.⁹

A high anxiety score is associated with increased labor pain, can increase the risk of negative birth¹⁰ and increases the mother's willingness to ask for pain medication during labor.¹¹ This is due to personality and social background, folklore and scary stories about unpleasant experiences from previous births and lack of social support are some of the causes that influence pregnancy or re-pregnancy, prenatal fear, beliefs about reasons that have nothing to do with individual behavior, previous epidurals, nullipara, surgical intervention, tissue damage during childbirth, lack of stress management.¹¹⁻¹³

Ways to reduce maternal anxiety, as well as help to have a positive birth experience should be a public health goal.¹⁴ Several interventions can be used to reduce the anxiety felt by mothers. Drug therapy such as antidepressants is widely used to reduce anxiety, but it puts risks to the developing fetus. Many mothers are worried about taking these drugs because they are worried about the fetus they contain.

Given the effect of pharmacological therapy on anxiety and pain management, non-pharmacological therapy is used, one of which is non-pharmacology interventions for mothers.¹⁵ Interventions that can be used include mindfulness interventions. Mindfulness is defined as the awareness to practice mindfulness with intentional, non-judgmental, and momentary experiences. It is characterized by the acceptance of all stimuli, both internal and external, and the ability to switch consciousness between stimuli. Mindfulness-based interventions conducted on 68 high-risk pregnant women in Heidelberg for 1 week showed a significant reduction in anxiety levels.¹⁶ Mindfulness interventions can overcome anxiety, pain in labor, and positive birth outcomes.

Mindfulness is a mental discipline that aims to develop awareness, emotion regulation, and compassion for self and others. Mindfulness encourages self-regulation by increasing acceptance, non-attachment and non-reactivity to temporary experiences, emotions and body sensations.¹⁷ Mindfulness interventions include activities such as awareness of breathing, body positions and walking, internal body sensations, thoughts and state of mind. A hypothesis underlying the mindfulness approach is that greater awareness increases insight, well-being, and reduces negative effects, which are important for pregnant women.^{18,19} Participating in mindfulness interventions can enhance positive birthing experiences. A high level of awareness can reduce negative reactions due to unavoidable negative events and promote effective coping with current events.²⁰

The purpose of this study was to analyze the effectiveness of mindfulness interventions on anxiety during labor through a systematic review.

Method

The method used in this research is a systematic review which aims to determine the effectiveness of mindfulness interventions on anxiety during labor. Data were identified from January 2012 to December 2022. The search was conducted through the Pro-Quest, Wiley Library, PubMed, Science Direct, Sage journal, and Cochrane library databases using the keywords "Mindfulness AND anxiety during labor". Study selection was carried out by selecting relevant titles and abstracts which were carried out directly by

the researcher. Then screening was carried out based on inclusion criteria, namely: original research journals in 2011-2022, with a population of pregnant women using mindfulness interventions, journals in English, and full text.

Results

The results of literature observations were obtained through the stages of identification, filtering, and determining criteria from data based proquest, Wiley Library, PubMed, Science Direct, Sage Journal, Cochrane Library (n = 478) and similar articles (n = 246), articles that were screened based on title and abstract (n = 232) and 35 were excluded because only abstracts were available. So the full text articles were 197, the full text articles that were excluded because they did not meet the inclusion criteria 157 so the remaining 40 articles, and the articles that met the criteria for analysis were 12 (Fig. 1). Based on the articles that have been obtained, there are 12 articles that discuss mindfulness interventions for the anxiety felt by pregnant women before giving birth. Number of research subjects were 1331. Mindfulness interventions in the articles found include several countries, including Canada 1 article, Egypt 1 article, Taiwan 1 article, Amsterdam 2 articles, Iran 1 article, Austria 1 article, San Francisco 1 article, Germany 1 article, Sweden 1 article, China 1 article, and Spain 1 article. The articles explained can be seen in Table 1.

Discussion

Of the 12 articles found, 9 articles explained that mindfulness interventions had a positive impact and were proven to reduce the anxiety felt by mothers.^{17,21-27} Meanwhile, 3 articles stated that mindfulness intervention could reduce stress and depression.²⁸⁻³⁰ The mindfulness intervention programs carried out vary from MBCP,^{23,25,28-30} online mindfulness,^{17,22,24} MBSR,²⁶ mindfulness-based cognitive therapy (MBCT),^{21,31} mind in labor.²⁷ The implementation of mindfulness interventions varies, namely carried out for 6-9 weeks.^{21,23,25,27-31}

Anxiety that is felt during pregnancy can cause labor that cannot be handled by the mother resulting in tension, hindering relaxation of the body, impacting the condition of the fetus in the womb. The muscles of the body tense up during this condition, especially the muscles in the uterine canal also become stiff so that it is difficult to expand.²⁵

The study was conducted in Egypt with a total of 82 third trimester pregnant women (>28 weeks) aged 20-35 years. The intervention group was given virtual mindfulness which was carried out via the WhatsApp group which consisted of two sessions, namely two theoretical sessions and six practical sessions which were carried out twice a week with a duration of 30 minutes. While the control group was given treatment as usual. The average anxiety score before the mindfulness intervention was given was 27.1 ± 8.7 and after the intervention the average anxiety score decreased by 21.8 ± 6.5 . Whereas in the control group on observation the average anxiety score was 28.4 ± 9.2 after being treated it became 26.1 ± 6.3 .

Anxiety in the mother plays a very important role in the progress of the birth process and interventions during labor. Anxiety in pregnancy is associated with shorter gestational age and has negative implications for fetal neurodevelopment and birth outcomes.^{23,32}

There are various methods that target behavior change for psychological support and anxiety reduction. One of these methods is mindfulness-based intervention.³³ Mindfulness has been shown to reduce anxiety that occurs for many reasons. Mindfulness as a tool helps pregnant women come to terms with the emotions they are feeling and the physical phenomena they encounter.³²

Table 1
Synthesis of previous research.

Authors	Method	Population	Intervention	Instruments	Results
Mackinnon et al. ²¹ (2021), Canada	Randomized controlled trial	n = 60 pregnant women with a gestational age of 12 to 28 weeks with a singleton pregnancy Randomly, 28 pregnant women were allocated to MBCT-PD and 32 pregnant women were given treatment as usual	Mindfulness based cognitive therapy (MBCT) session: 8 weeks, 2 hours	The Pregnancy Related Anxiety (PRA) Generalized Anxiety Disorder (GAD-7) Scale Perceived Stress Scale (PSS)	Psychological outcomes: the significant effect of the intervention group shows that the intervention group predicts changes in psychological distress ratings over time, so that participants with the MBCT-PD intervention report reduced psychological distress The results of the study show that there is a significant indirect treatment effect of MBCT-PD through reducing pregnancy anxiety after the T2 intervention by reducing symptoms of pregnancy anxiety
Nasr et al. ³⁴ (2022), Egypt	A quasi experimental	n = 82 participants. Participants were divided into two groups, namely the intervention group and the control group, each consisting of 41 pregnant women with predetermined inclusion criteria. Primigravida and multigravida women are both in their third trimester (over 28 weeks gestational age).	Mindfulness virtual 30 minutes	Pregnancy-Related anxiety questionnaire - revised-2 (PRAQ-R2) Five Facet Mindfulness Questionnaire (FFMQ)	The results showed significant differences in levels of anxiety, the five aspects of attention between the groups after implementation (control, intervention group). In addition, there are differences regarding complications during childbirth, problems neonatal health, and type of feeding between the two groups
Pan et al. ²⁸ (2019), Taiwan	Randomized controlled trial	n = 74 pregnant women, with 35 participants in the comparison group and 39 participants in the intervention group. 13 and 28-weeks gestation singleton pregnancy at least 20 years of age	MBCP session: 8 weeks, 3 hours	Perceived Stress Scale (PSS-10) Edinburgh Postnatal Depression Scale (EPDS)	The mindfulness intervention program performed significantly better in the intervention group than the comparison group Mindfulness intervention programs effectively reduce perceived stress and depression Mindfulness provides long-term benefits that mothers can receive during pregnancy and the postpartum period

Table 1
(Continued)

Authors	Method	Population	Intervention	Instruments	Results
Veringa-Skiba et al. ²³ (2021), Amsterdam	Randomized controlled trial	n = 141 pregnant Intervention group n = 75 and control n = 66 nulli-, and multi-parous pregnant women aged ≥ 18 years	MBCP session: 9 weeks, 3 hours	Wijma Delivery Expectation Questionnaire (W-DEQ-A) DSM-5 Perinatal Anxiety Disorder Labor (DSM-5 PAD-L Catastrophizing Labor Pain (CLP dan Labor Pain Acceptance Questionnaire (LPAQ)	The main results of the study, namely mean childbirth anxiety decreased after MBCP and enhanced care as usual (ECAU), but the decrease was significantly greater by MBCP
Zarenejad et al. ²⁶ (2020), Iran	Randomized controlled trial	n = 60, 30 pregnant women in the control group and 30 pregnant women in the intervention group with first pregnancy a gestational age of 24-36 weeks, single fetus, no pregnancy complications	Mindfulness based stress reduction (MBSR) session: 6 weeks, 1 hour	Pregnancy Related Anxiety Questionnaire (PRAQ) Mindfulness Questionnaire Self Efficacy in Coping with Childbirth Questionnaire	The results of the study assessed changes in pregnancy anxiety scores before, immediately after, and one month after the intervention, indicating that the duration of the intervention affected the anxiety score Self-efficacy scores before, immediately after, and one month after the intervention showed that length of time did not affect self-efficacy scores and there was no significant difference between the two groups
Zemestani and Fazeli Nikoo ³¹ (2020), Austria	Randomized controlled trial	n = 38 pregnant women. The intervention group was 19 people and the control group was 19 people aged 18 years or older 1 to 6 months of gestational age	Mindfulness based cognitive therapy (MBCT) session: 8 weeks, 2 hours	Beck Depression Inventory II (BDI-II) Beck Anxiety Inventory (BAI) Emotional Regulation Questionnaire (ERQ)	The MBCT group experienced a significant reduction in BAI scores from baseline to post-treatment and the BAI scores remained significantly lower compared to the control group at follow-up
Sbrili et al. (2020), ²⁷ San Fransisco	Randomized controlled trial	n = 30 nulliparous single baby pregnancies third trimester pregnant women	Mind in labor session: 2-5 days	Center for Epidemiologic Studies Depression Scale State-Trait Anxiety Inventory (STAI) Perceived Stress Scale (PSS) Five Facet Mindfulness Questionnaire (FFMQ)	Mind in labor can reduce mental health to a greater extent than general treatment

Table 1
(Continued)

Authors	Method	Population	Intervention	Instruments	Results
Sacristán Martín et al. ²⁹ (2019), Spain	Randomized controlled trial	n = 122, 61 participants of pregnant women and their partners in each intervention group and control group second trimester pregnant women	Mindfulness-based childbirth and parenting (MBCP) program session: 9 weeks, 3 hours	Edinburgh Postnatal Depression Scale (EPDS) The Perceived Stress Scale (PSS) The Positive and Negative Affect Schedule (PANAS) The Five Facet Mindfulness Questionnaire (FFMQ) The Self-Compassion Scale (SCS) The Parental Evaluation Scale (EEP) The Client Service Receipt Inventory (CSRI)	MBCP is an effective alternative strategy to improve mental and physical health and well-being, to reduce depressive symptoms, and to manage pain and reduce stress MBCP is also useful for expectant parents preparing for labor to manage pain during pregnancy and labor
Gunilla et al. (2020) ³⁰ , Sweden	Randomized controlled trial	193 pregnant women; 96 mothers were included in the intervention group and 97 mothers were included in the control group	Mindfulness-based childbirth and parenting (MBCP) session: 8 weeks, 2 hours	Perceived Stress Scale (PSS) Positive States of Mind (PSOM) Five-Facet Mindfulness Questionnaire (FFMQ)	MBCP significantly reduced perceived anxiety, stress, and depressive symptoms compared to the control group
Yang et al. ²⁴ (2019), China	Randomized controlled trial	n = 123 pregnant women the intervention group consisted of 62 pregnant women and the control group consisted of 61 pregnant women A gestational age of 24 to 30 weeks; aged more than 18 years	Mindfulness online (Wechat platform) session: 8 weeks, 40 minutes	Generalized Anxiety Disorder (GAD-7) Patient Health Questionnaire (PHQ-9)	Participants in the intervention group showed a greater reduction compared to the control group Online mindfulness interventions can be a technique to help pregnant women reduce depression and anxiety
Mitho et al. (2020) ³⁵ , Germany	Randomized controlled trial	280 pregnant women; each intervention group and control group were 140 participants with, gestational age in the third trimester	Electronic mindfulness-based intervention session: 8 weeks, 45 minutes	The Edinburgh Postnatal Depression Scale (EPDS) State-Trait Anxiety Questionnaire (STAI) Pregnancy-Related Anxiety Questionnaire (PRAQ-R)	E-based solutions can reduce geographic, financial and psychological limitations Interventions provide effective and cost-effective assistance to pregnant women with psychological distress and can thereby reduce the negative impact on birth outcomes
Veringa et al. ²⁵ (2016), Amsterdam	A-quasi experimental	128 pregnant women with a gestational age of 16 to 26 weeks with high fear of giving birth, primiparous and multiparous women aged ≥18	Mindfulness-based childbirth and parenting (MBCP)	Wijma Delivery Expectancy Questionnaire (W-DEQ) Depression, Anxiety, Stress Scale (DASS-21) Labour Pain Acceptance Questionnaire (LPAQ)	MBCP can reduce fear of childbirth, reduce non-urgent medical interventions during labor, reduce anxiety, and reduce labor pain

ECAU: enhanced care as usual; MBCP: mindfulness-based childbirth and parenting; MBCT: mindfulness based cognitive therapy, MBCT-PD: mindfulness-based cognitive therapy for perinatal depression; MBSR: mindfulness based stress reduction.

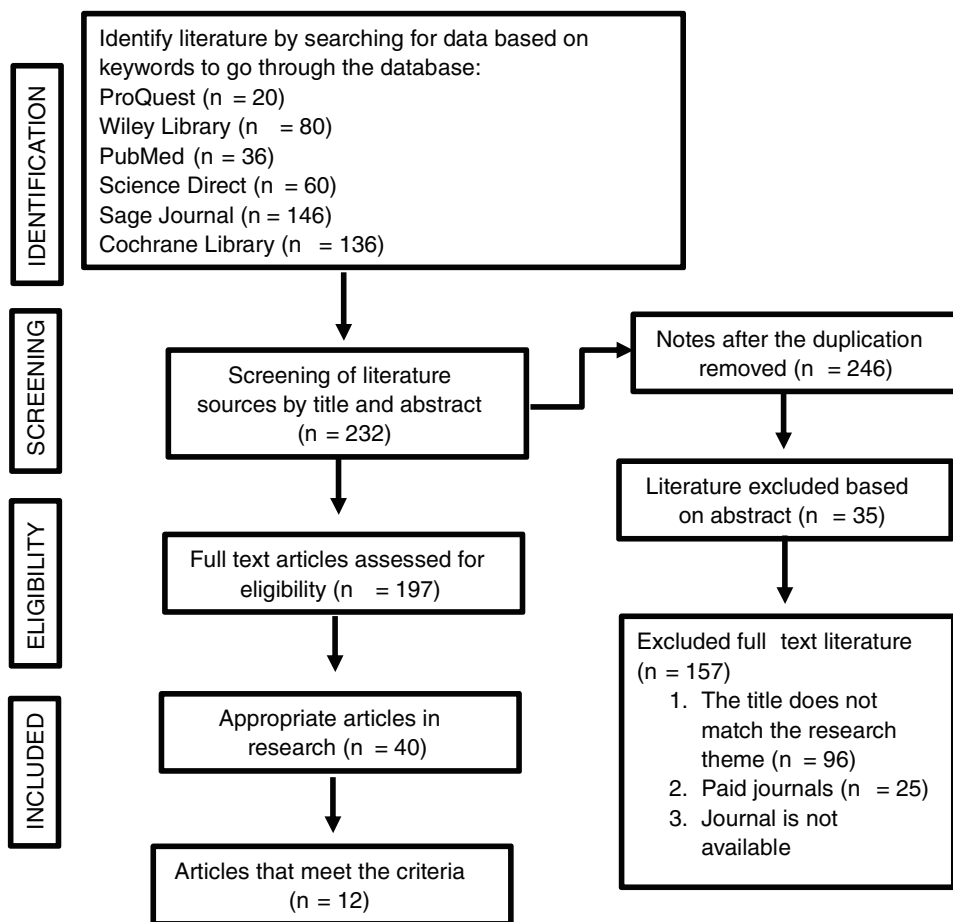


Figure 1. PRISMA flowchart.

Research study in Amsterdam conducted on 141 pregnant women. The intervention group was given mindfulness based childbirth and parenting for 9 sessions which were carried out once a week with a duration of 3 hours each session and were encouraged to do informal mindfulness at home every day for 30 minutes. Sessions on mindfulness practice include mindfulness meditations and body scans. Whereas the control group was given enhanced care as usual intervention consisting of two individual sessions in a 10-week period. The average anxiety score as measured by perinatal anxiety disorder labor (DSM-5 PAD-L) before the intervention was 26.76 and after the intervention was 23.53. While the control group in the observation before treatment was 27.80 and after treatment was 26.27.

This study is in line with research conducted on 80 pregnant women showing that mindfulness-integrated cognitive behavior therapy (Mi-CBT) is effective in reducing depression and anxiety in pregnant women, this positive impact can be seen for one month after implementing it.³³

The mindfulness training intervention carried out for 8 weeks found that there was a significant decrease in anxiety. The mindfulness training learned during the intervention has long-lasting effects. Mindfulness interventions are best administered during the prenatal and postnatal periods to maintain the beneficial effects.³⁶ Mindfulness based interventions are effective in enhancing perinatal psychological well-being. Mindfulness based intervention is designed to increase psychological flexibility which is a fundamental aspect of health.³⁷

Mindfulness has an alternative way of meeting emotions that are felt in a different way, namely by acknowledging and paying full attention to feelings rather than avoiding or reacting to them.

It is very tiring and not effective in the long run. Mindfulness is a radical intervention, which means daring to take steps and challenge towards perceived difficulties, whatever the difficulties. This action can change your relationship with anxiety because it gives freedom for the emotion to move forward.²⁸

Mindfulness has the potential to numb or manage emotional reactivity to anxiety-provoking situations; it helps people pause, overcome chaos, see more clearly, and respond with freedom.³⁸ Mindfulness therapy can change anxiety associations by replacing unhelpful thoughts and behaviors with positive alternatives.³⁹ Mindfulness can rewire our brains so that our reactions to an emotion are less likely to trigger anger. The amygdala is the part of the human brain that is responsible for regulating fear and emotions and managing responses to stressors. Recent magnetic resonance imaging (MRI) data show that mindfulness practice can reduce gray matter in the brain's amygdala, which may dampen the stress response.⁴⁰⁻⁴⁴

Other research has shown that gray matter in the pre-frontal cortex, the area of the brain responsible for higher-order cognitive thinking, such as problem solving, planning, and emotional control, can increase after mindfulness practice. The brain's memory and learning center, the hippocampus, has also been shown to increase in volume after mindfulness practice.⁴⁵⁻⁴⁹

A longitudinal change in brain gray matter concentration after eight weeks of mindfulness practice compared to a control group. The hypothesis of increased gray matter concentration in the left hippocampus was confirmed. Exploratory whole-brain analysis identified significant increases in gray matter concentrations in the posterior cingulate cortex, temporo-parietal junction, and cerebellum.^{50,51}

Mindfulness resulted in increases in brain activation during interventional assessment and reception in the medial, dorso-medial, dorsolateral, and ventrolateral prefrontal cortex; superior parietal and lateral occipital areas; and the caudate nucleus. These results converge with brain patterns detected previously in healthy non-anxious adults using the same autobiographical social situation fMRI emotion regulation⁵²⁻⁵⁴ in control of executive attention during reception of sad images, and in perspective shift and effortful attention during distraction from stressful events.^{55,56}

Dispositional mindfulness levels have a significant association with mood so that higher mindfulness scores are associated with lower stress and anxiety scores and pregnancy-related depression, adversity and rates of negative pregnancy experiences. However, it is not clear whether low levels of mindfulness are related to high levels of anxiety and stress.^{39,57-60}

Mindfulness-based childbirth and parenting reduced prenatal fear, reduced labor pain, and non-urgent obstetrical interventions, and increased acceptance of painless labor and delivery without medication.⁶¹

Conclusions

Management of anxiety about childbirth is important for pregnant women. Mindfulness interventions are effective for reducing anxiety about labor and increasing comfort during labor. Mindfulness intervention mechanisms have the potential to reduce anxiety by increasing skills to regulate emotions. Mindfulness in the future can be used as a non-pharmacological intervention option to reduce anxiety. Future researchers can conduct long-term research after delivery and delivery outcomes.

What is known about the topic?

In general, the results of a review of previous articles found that mindfulness interventions had a positive impact and were proven to reduce the anxiety felt by mothers before giving birth, especially in mothers with first pregnancies who had greater feelings of fear and anxiety. The duration of the intervention influences the duration of the reduction in anxiety during pregnancy, childbirth and postpartum, although it does not affect efficacy. Mindfulness intervention is an effective and cost-effective intervention.

What does this study add to the literature?

Because there are no systematic reviews that discuss mindfulness which is associated with anxiety in pregnant women before delivery, especially in pregnant women for the first time. This literature can also be used as information for pregnant women about one of the complementary therapies that can be done to reduce anxiety about the dreaded birth.

What are the implications of the results?

Mindfulness is proven to reduce anxiety that occurs for many reasons. Mindfulness is a tool to help pregnant women accept the emotions they are feeling and the physical phenomena they are feeling. Mindfulness is effective in reducing depression and anxiety for pregnant women, the positive impact can be seen for one month after applying it. Mindfulness intervention programs effectively reduce perceived stress and depression. Mindfulness provides long-term benefits that mothers can receive during pregnancy and the postpartum period.

Editor in charge

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Authorship contributions

F.I. Kundarti: research draft, collect data, analysis. Kiswati: collecting literature, selecting literature. I.N.T. Komalyna: data analysis, editing, and conclusions.

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Conflicts of interest

None.

References

- Gheibi Z, Abbaspour Z, Haghighyzadeh MH, et al. Effects of a mindfulness-based childbirth and parenting program on maternal-fetal attachment: a randomized controlled trial among Iranian pregnant women. *Complement Ther Clin Pract*. 2020;41:101226.
- Aksoy M, Aksoy AN, Dostbil A, et al. The relationship between fear of childbirth and women's knowledge about painless childbirth. *Obstet Gynecol Int*. 2014;2014:1-7.
- Pinar SE, Demirel G. The effect of therapeutic touch on labour pain, anxiety and childbirth attitude: a randomized controlled trial. *Eur J Integr Med*. 2021:41.
- Hulsbosch LP, Nyklíček I, Potharst ES, et al. Online mindfulness-based intervention for women with pregnancy distress: design of a randomized controlled trial. *BMC Pregnancy Childbirth*. 2020;20:159.
- Goodman JH, Guarino A, Chenausky K, et al. CALM Pregnancy: results of a pilot study of mindfulness-based cognitive therapy for perinatal anxiety. *Arch Womens Ment Health*. 2014;17:373-87.
- Amidu N, Alhassan M, Issah H, et al. Perceived stress and anxiety in women during labour: a case of Tamale West Hospital, Tamale. Ghana. *Asian J Med Health*. 2018;11:1-10.
- Boryri T, Noori NM, Teimouri A, et al. The perception of primiparous mothers of comfortable resources in labor pain (a qualitative study). *Iran J Nurs Midwifery Res*. 2016;21:239.
- Shirazi MA. Investigating The Effectiveness Of Mindfulness Training In The First Trimester Of Pregnancy On Improvement Of Pregnancy Outcomes And Stress Reduction In Pregnant Women Referred To Mohebyasgeneral Women Hospital. *Journal of Fundamental and Applied Sciences*. 2016;8:487-500.
- Matthews J, Huberty JL, Leiferman JA, et al. Perceptions, uses of, and interests in complementary health care approaches in depressed pregnant women: the PAW Survey. *J Evid Based Complementary Altern Med*. 2017;22:81-95.
- Curzik D, Jokic-Begic N. Anxiety sensitivity and anxiety as correlates of expected, experienced and recalled labor pain. *J Psychosom Obstet Gynaecol*. 2011;32:198-203.
- Hulsbosch LP, Nyklíček I, Potharst ES, et al. Development of the Labor Pain Relief Attitude Questionnaire for pregnant women (LPAQ-p). *BMC Pregnancy Childbirth*. 2020;20:1-12.
- Booth JL, Sharpe EE, Houle TT, et al. Patterns of recovery from pain after cesarean delivery. *Pain*. 2018;159:2088-96.
- Rondung E, Ekdahl J, Sundin O. Potential mechanisms in fear of birth: the role of pain catastrophizing and intolerance of uncertainty. *Birth*. 2019;46:61-8.
- Warriner S, Crane C, Dymond M, et al. An evaluation of mindfulness-based childbirth and parenting courses for pregnant women and prospective fathers/partners within the UK NHS (MBCP-4-NHS). *Midwifery*. 2018;64:1-10.
- Kuyken W, Hayes R, Barrett B, et al. Effectiveness and cost-effectiveness of mindfulness-based cognitive therapy compared with maintenance antidepressant treatment in the prevention of depressive relapse or recurrence (PREVENT): a randomised controlled trial. *Lancet*. 2015;386:63-73.
- Dennis CL, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *Br J Psychiatry*. 2017;210:315-23.
- Goetz M, Schiele C, Müller M, et al. Effects of a brief electronic mindfulness-based intervention on relieving prenatal depression and anxiety in hospitalized high-risk pregnant women: exploratory pilot study. *J Med Internet Res*. 2020;22:e17593.
- Hassed C, Chambers R. Mindful learning: reduce stress and improve brain performance for effective learning. Google Books. Exisle Publishing; 2014. Available from: https://books.google.co.id/books?hl=en&lr=&id=diWNAgAAQBAJ&oi=fnd&pg=PA1&ots=qw5_B-43hn&sig=z3dHYSKVeISMEaceaXR7zD0GzE&redir_esc=y#v=onepage&q&f=false.

19. Grossman P, Niemann L, Schmidt S, et al. Mindfulness-based stress reduction and health benefits: a meta-analysis. *J Psychosom Res.* 2004;57:35–43.
20. Khoury B, Sharma M, Rush SE, et al. Mindfulness-based stress reduction for healthy individuals: a meta-analysis. *J Psychosom Res.* 2015;78:519–28.
21. Mackinnon AL, Madsen JW, Giesbrecht GF, et al. Effects of mindfulness-based cognitive therapy in pregnancy on psychological distress and gestational age: outcomes of a randomized controlled trial. *Mindfulness.* 2021;12:1173–84.
22. Mohamed S, Elashry R. Effect of swaddle bathing versus traditional bathing on physiological stability and comfort level among neonates. *Assiut Sci Nurs J.* 2022;10:68–79.
23. Veringa-Skiba IK, de Bruin EI, van Steensel FJA, et al. Fear of childbirth, nonurgent obstetric interventions, and newborn outcomes: a randomized controlled trial comparing mindfulness-based childbirth and parenting with enhanced care as usual. *Birth.* 2022;49:40–51.
24. Yang M, Jia G, Sun S, et al. Effects of an online mindfulness intervention focusing on attention monitoring and acceptance in pregnant women: a randomized controlled trial. *J Midwifery Womens Health.* 2019;64:68–77.
25. Veringa IK, de Bruin EI, Bardacke N, et al. "I've Changed My Mind", Mindfulness-Based Childbirth and Parenting (MBCP) for pregnant women with a high level of fear of childbirth and their partners: study protocol of the quasi-experimental controlled trial. *BMC Psychiatry.* 2016;16:377.
26. Zarenejad M, Yazdkhasti M, Rahimzadeh M, et al. The effect of mindfulness-based stress reduction on maternal anxiety and self-efficacy: a randomized controlled trial. *Brain Behav.* 2020;10:e01561.
27. Sbrilli MD, Duncan LG, Laurent HK. Effects of prenatal mindfulness-based childbirth education on child-bearers' trajectories of distress: a randomized control trial. *BMC Pregnancy Childbirth.* 2020;20:623.
28. Pan WL, Chang CW, Chen SM, et al. Assessing the effectiveness of mindfulness-based programs on mental health during pregnancy and early motherhood — a randomized control trial. *BMC Pregnancy Childbirth.* 2019;19:346.
29. Sacristán-Martín O, Santed MA, García-Campayo J, et al. A mindfulness and compassion-based program applied to pregnant women and their partners to decrease depression symptoms during pregnancy and postpartum: study protocol for a randomized controlled trial. *Trials.* 2019;20:654.
30. Lönnberg G, Jonas W, Unteraehrer E, et al. Effects of a mindfulness based childbirth and parenting program on pregnant women's perceived stress and risk of perinatal depression — results from a randomized controlled trial. *J Affect Disord.* 2020;262:133–42.
31. Zemestani M, Fazeli Nikoo Z. Effectiveness of mindfulness-based cognitive therapy for comorbid depression and anxiety in pregnancy: a randomized controlled trial. *Arch Womens Ment Health.* 2020;23:207–14.
32. Molek-Winiarska D, Żońnierczyk-Zreda D. Application of mindfulness-based stress reduction to a stress management intervention in a study of a mining sector company. *Int J Occup Saf Ergon.* 2018;24:546–56.
33. Malekpoorafshar M, Salehinejad P, Pouya F, et al. A shift toward childbearing in one-child families through a mindfulness-based stress reduction program: a randomized controlled trial. *J Family Reprod Health.* 2021;15:19–27.
34. Nasr ESG, Genedy ASE, Osman NE, Abdelmonem RM, Abdelraof AI. Effect of Swaddle Bathing versus Traditional Bathing on Physiological Stability and Comfort level among Neonates El Saida Gouda Nasr1, Amal Sarhan Eldesokey Genedy 2, Nehmedo Ezzat Osm. *Assiut Scientific Nursing Journal.* 2022;10:68–79.
35. Müller M, Matthes LM, Goetz M, Abele H, Brucker SY, Bauer A, et al. Effectiveness and cost-effectiveness of an electronic mindfulness-based intervention (eMBI) on maternal mental health during pregnancy: the mindmom study protocol for a randomized controlled clinical trial. *Trials.* 2020;21:933.
36. Innab A, Al-khunaizi A, Al-otaibi A, et al. Effects of mindfulness-based childbirth education on prenatal anxiety: a quasi-experimental study. *Acta Psychol (Amst).* 2023;238:103978.
37. Yazdanimehr R, Omidi A, Sadat Z, et al. The effect of mindfulness-integrated cognitive behavior therapy on depression and anxiety among pregnant women: a randomized clinical trial. *J Caring Sci.* 2016;5:195–204.
38. Alidina S. *Mindfulness for dummies.* 3rd ed. Hoboken, NJ: John Wiley & Sons; 2020.
39. Krusche A, Crane C, Dymond M. An investigation of dispositional mindfulness and mood during pregnancy. *BMC Pregnancy Childbirth.* 2019;19:1–8.
40. Shaffer FB, Moss D. Review of I. Z. Khazan (2019), *Biofeedback and mindfulness in everyday life: practical solutions for improving your health and performance.* W. W. Norton and Company. *Appl Psychophysiol Biofeedback.* 2022;47:357–60.
41. Cuddy AJ. *Presence. Bringing your boldest self to your biggest challenges.* New York: Little, Brown & Company; 2016.
42. Decker JT, Brown JLC, Ashley W, et al. Mindfulness, meditation, and breathing exercises: reduced anxiety for clients and self-care for social work interns. *Soc Work Groups.* 2019;42:308–22.
43. *The Mindfulness Workbook for Anxiety: The 8-Week Solution to Help You Manage Anxiety, Worry & Stress* by Tanya J. Peterson | Goodreads [Internet]. [cited 2023 Aug 1]. Available from: <https://www.goodreads.com/book/show/39786811-the-mindfulness-workbook-for-anxiety>
44. Twhig MP, Levin ME. Acceptance and commitment therapy as a treatment for anxiety and depression: a review. *Psychiatr Clin North Am.* 2017;40:751–70.
45. Hofmann SG, Sawyer AT, Witt AA, et al. The effect of mindfulness-based therapy on anxiety and depression: a meta-analytic review. *J Consult Clin Psychol.* 2010;78:169–83.
46. Hofmann SG, Gómez AF. Mindfulness-based interventions for anxiety and depression. *Psychiatr Clin North Am.* 2017;40:739–49.
47. Late-Breaking Science Abstracts and Featured Science Abstracts from the American Heart Association's Scientific Sessions 2022 and Late-Breaking Abstracts in Resuscitation Science From the Resuscitation Science Symposium 2022. *Circulation.* 2022;146:e569-605.
48. Parmentier FBR, García-Toro M, García-Campayo J, et al. Mindfulness and symptoms of depression and anxiety in the general population: the mediating roles of worry, rumination, reappraisal and suppression. *Front Psychol.* 2019;10:438030.
49. Vveinhardt J, Kaspary M. The relationship between mindfulness practices and the psychological state and performance of kyokushin karate athletes. *Int J Environ Res Public Health.* 2022;19:4001.
50. Doll A, Hölzel BK, Mulej Bratec S, et al. Mindful attention to breath regulates emotions via increased amygdala-prefrontal cortex connectivity. *Neuroimage.* 2016;134:305–13.
51. Latendresse G. Mindful birthing: training the mind, body and heart for childbirth and beyond. *J Midwifery Womens Health.* 2013;58:351.
52. Goldin PR, Moodie CA, Gross JJ. Acceptance versus reappraisal: behavioral, autonomic, and neural effects. *Cogn Affect Behav Neurosci.* 2019;19:927–44.
53. Isgut M, Smith AK, Reimann ES, et al. The impact of psychological distress during pregnancy on the developing fetus: biological mechanisms and the potential benefits of mindfulness interventions. *J Perinat Med.* 2017;45:999–1011.
54. Taylor BL, Cavanagh K, Strauss C. The effectiveness of mindfulness-based interventions in the perinatal period: a systematic review and meta-analysis. *PLoS One.* 2016;11:e0155720.
55. Lebois LA, Papies EK, Gopinath K, et al. A shift in perspective: decentering through mindful attention to imagined stressful events. *Neuropsychologia.* 2015;75:505–24.
56. Duncan LG, Bardacke N. Mindfulness-based childbirth and parenting education: promoting family mindfulness during the perinatal period. *J Child Fam Stud.* 2010;19:190–202.
57. Jong J, Ross R, Philip T, et al. The religious correlates of death anxiety: a systematic review and meta-analysis. *Religion Brain Behav.* 2018;8:4–20.
58. Murakami H, Nakao T, Matsunaga M, et al. The structure of mindful brain. *PLoS One.* 2012;7:e46377.
59. Neel ML, Yoder P, Matusz PJ, et al. Randomized controlled trial protocol to improve multisensory neural processing, language and motor outcomes in preterm infants. *BMC Pediatr.* 2019;19:81.
60. Kober H, Buhle J, Weber J, et al. Let it be: mindful acceptance down-regulates pain and negative emotion. *Soc Cogn Affect Neurosci.* 2019;14:1147–58.
61. Veringa-Skiba IK, Ziemer K, de Bruin EI, et al. Mindful awareness as a mechanism of change for natural childbirth in pregnant women with high fear of childbirth: a randomised controlled trial. *BMC Pregnancy Childbirth.* 2022;22:47.