

## The spiritual effects of yoga during the birth process

Tuğba YILMAZ ESENCAN<sup>a,\*</sup> & Gülay RATHFISCH<sup>b</sup>

<sup>a</sup>Üsküdar University, Department of Midwifery, Faculty of Health Sciences, Üsküdar University, Türkiye, 38000,  
ORCID: 0000-0002-8748-0793

<sup>b</sup>Atlas University, Department of Midwifery, Faculty of Health Sciences, Atlas University, Türkiye, 38000,  
ORCID: 0000-0002-5987-9852

\*E-mail: tugba.yilmazesencan@uskudar.edu.tr

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A transition begins to a period in which all emotions intensify together with the physiological, mental and emotional changes that occur during the journey of birth which is shaped with the beginning of birth process. Birth process is a moral and spiritual journey for a woman. In addition to all accompanying symptoms with the start of labour, the woman needs more support with uterus contractions. Yoga and meditation practices during the antenatal period are effective in promoting balance and surrender to the process for women. The mind is set free and perfect unity of body, mind and spirit is ensured in each asana during yoga practices. In each asana during birth process, the body, mind and spirit are united and integrated. In the meantime, the individuals drift apart from the impacts of external environment, introversion is enabled, and thus the labour is let flow. Yoga asanas implemented during labour may be shaped in accordance with the flow of labour and woman's needs. With these features, perinatal yoga asanas support the mother and foetus physically and spiritually. This compilation aims to examine the effects of aspiritual integrity through yoga.

**Keywords:** Breath awareness, Labour support, Meditation, Midwife, Yoga at birth

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In the present-day context, it is becoming increasingly overlooked that birth, influenced by rapidly advancing healthcare services and technology, is a natural and instinctive process. Consequently, it is observed that women are losing touch with their inherent strength to give birth, forgetting the power of their own bodies, and becoming disconnected from their physical selves. Instead of being actively engaged in the birthing process, they often surrender control to healthcare professionals, resulting in a rise in the rates of cesarean sections and other intervention-based births<sup>1</sup>. According to the World Health Organization (WHO), the recommended rate of cesarean sections should not exceed 15%. However, in our country, the current rate of cesarean births far surpasses this threshold. This increase represents a significant issue that must be addressed in terms of the health and well-being of both mothers and infants, necessitating the implementation of appropriate measures. Prenatal education is considered a crucial component in resolving this problem, as it equips couples with knowledge about pregnancy, childbirth, and the postpartum period. Furthermore, such education

enhances a woman's self-confidence in her ability to have a vaginal birth, promotes body awareness, and teaches techniques like breath awareness and relaxation, which facilitate coping with uterine contractions<sup>1-3</sup>. In addition to birth preparation classes, exercise, complementary alternative methods, yoga, and meditation are effective approaches for reducing C-section rates<sup>4</sup>. Among these, yoga practices are highly recommended and favored as the most suitable form of exercise to be performed during pregnancy.

### **Yoga in the process of pregnancy**

Rooted in India and dating back to ancient times, yoga is a discipline aimed at achieving control over the mind and body. It is considered a science that encompasses the harmony of the body, mind, and spirit, achieved through the cultivation of a clear and focused mind. In particular, breath awareness and relaxation exercises hold great significance in yoga. With its diverse benefits, yoga has emerged as a preferred practice during pregnancy since the 20<sup>th</sup> century<sup>1,4,5</sup>. Among the various forms of yoga, Hatha Yoga stands out as the most suitable and widely practiced during pregnancy and childbirth. Hatha Yoga combines specific breath exercises with postures to promote heightened awareness, increased

\*Corresponding author

consciousness, and relaxation<sup>6</sup>. Yoga during pregnancy extends beyond mere physical exercise, drawing upon a tradition that spans thousands of years and emphasizing meditation alongside physical postures<sup>1,4</sup>.

Regular prenatal yoga practices offer numerous benefits during pregnancy. Yoga asanas can be modified to accommodate the changing needs and conditions of the body throughout pregnancy, making it suitable for practice until the end of pregnancy<sup>7</sup>. These practices strengthen the uterus and perineal muscles, support the spine, and improve blood circulation, thereby helping to alleviate common medical issues experienced during pregnancy, such as fluctuations in blood pressure, excessive weight gain, fatigue, edema, and urinary problems<sup>8</sup>. Several studies have investigated the effects of yoga on pregnant women. In a study by Pan, Chang, Chen<sup>9</sup>, 74 pregnant women practiced basic yoga exercises for 8 weeks during the second and third trimesters. The study aimed to assess the impact of yoga on stress, anxiety, and pain. The results indicated that yoga had a positive effect on physical complaints, particularly posture-related issues, and reduced anxiety, especially during the second trimester. Another study involved 100 pregnant women practicing a mindfulness-based intervention program during the second and third trimesters<sup>10</sup>. The study found that these practices reduced stress and depression and had a positive impact on the participants. Similarly, Kusaka *et al.*<sup>11</sup> conducted an experimental study with 60 pregnant women, examining the impact of yoga on stress levels. Yoga sessions were held twice a month from the 20th week of pregnancy until birth, and cortisol and alpha-amylase concentrations in saliva were measured. The study found that cortisol and alpha-amylase levels decreased after yoga sessions, indicating a reduction in stress<sup>11</sup>.

Evidence-based guidelines from organizations such as The National Institute for Health and Clinical Excellence (NICE) and The Royal College of Midwives (RCM) recommend the use of breath and relaxation exercises during labor<sup>12,13</sup>. While high-quality studies specifically focusing on the impact of prenatal yoga on childbirth outcomes are limited, these guidelines suggest that regular exercise during pregnancy is beneficial for healthy pregnancies<sup>1,12,13</sup>. Additional studies have explored the effects of yoga on birth outcomes. A study by Mitchell *et al.*<sup>14</sup> found that yoga reduced the risk of premature birth and had

a positive impact on newborn weight. Qualitative research conducted by Campbell and Nolan<sup>15</sup> in three different yoga classes demonstrated that yoga and meditation not only had physical effects but also empowered women in making decisions during childbirth. The study concluded that prenatal yoga also played a role in preparing women emotionally and socially for birth<sup>15</sup>.

While it is believed that prenatal yoga can reduce pain and the need for pharmacological interventions by shortening the duration of labor, more scientific studies are needed to support these hypotheses<sup>16</sup>. A retrospective study by Steel *et al.*<sup>17</sup> examined the use of complementary and alternative methods by pregnant women and their relationship to adverse birth outcomes. The study recommended that birth teams improve their knowledge and skills in methods such as yoga, meditation, aromatherapy, and massage. Although there is a substantial body of international literature on the monitoring and assessment of the impact of yoga and meditation on pregnancy and birth<sup>18</sup>, more research is needed in Turkiye to further investigate these practices.

#### **Yoga in the birth process**

Birth is a natural process that requires the active participation of women, guided by their instincts, and should involve minimal interventions<sup>19,20</sup>. Each woman is unique and experiences a different birthing journey, with variations even within their own birth experiences. It has been observed that the duration of labor can vary significantly among women<sup>21,22</sup>. The birthing process allows the pregnant woman to witness the extraordinary physical, emotional, and spiritual connection she establishes with her own body and the fetus<sup>23</sup>. Therefore, it is essential to protect this unity and allow the birthing process to unfold naturally, with minimal medical interventions and without the use of pharmacological agents that are unnecessary<sup>24</sup>.

In a cross-sectional study, a sample of 500 pregnant women was examined to compare those admitted to the delivery room during the latent phase versus those admitted during the active phase. The study found a statistically significant increase in invasive interventions and C-section rates among women admitted during the latent phase. This highlights the importance of closely monitoring the first phase of labor, as any interference during this phase can impact the subsequent stages of the birth process<sup>21</sup>. While it is acknowledged that certain

exceptional situations may require medical interventions for the well-being of the pregnant woman and the fetus, the majority of women are capable of giving birth safely and naturally without extensive medical interventions. It is crucial that interventions during the birth process are kept to a minimum, ensuring that the natural course of labor is respected and preserved. Several studies support this approach, emphasizing the importance of maintaining the integrity of the birth process with minimal interference<sup>24-30</sup>.

The birth process is often regarded as a transformative and spiritual journey for women. It involves a sense of renewal and rebirth, not only for the woman herself but also in connection with the growing fetus. This spiritual transformation can have a lasting impact on the woman's life beyond the birthing experience. Therefore, various methods that facilitate staying in the flow during birth are highly effective. Among these methods, exercises, psychodrama, yoga, and meditation play a significant role in following one's instincts during the birth process. In particular, incorporating breath awareness exercises, yoga, and meditation provides valuable support and promotes relaxation throughout the entire birthing journey<sup>28</sup>. Benefits of yoga practices during birth are emphasized here. Yoga helps clear the mind and reduces neocortical stimulation, it increases the secretion of endorphins, allowing the body to experience a natural state of relaxation and well-being. Yoga enables the harmonization between the movements of the uterus and the body, promoting a smoother and more efficient birth process. It helps the pregnant woman identify suitable positions for birth by enhancing body awareness and allowing her to intuitively choose the most comfortable asana. Yoga practices utilize the impact of gravity, assisting in the progression of labor and delivery. It facilitates the orientation to birth pain and promotes a sense of harmony and control during the process. By revitalizing the body's innate potential and strength, yoga raises instinctive awareness and empowers the pregnant woman. It enhances the pregnant woman's competence and confidence as a woman, in giving birth, and in becoming a mother. Yoga encourages the woman to focus on her breath, body, and spirit rather than solely on contractions, fostering the ability to concentrate and remain in the present moment<sup>1,31</sup>.

Breath exercises in yoga focus on deep and proper inhalation and exhalation, rather than a simple form of

breathing. Breath represents our life energy, and yoga serves to nourish this energy<sup>32</sup>. During yoga practices, each asana allows the mind to be freed, and the body, mind, and spirit are united in perfect harmony. Similarly, in the birth process, each asana brings about the unity of the body, mind, and spirit. During this time, the woman becomes detached from external influences, achieving introversion and allowing the labor to flow naturally. Each asana contributes to a calm and peaceful birth process. Maintaining such calmness and peace is crucial for a woman during labor. Yoga and meditation practices are highly effective in overcoming the fears and anxieties that can hinder labor. By keeping the mind in the background and inactive, yoga enables the individual to transcend fear and anxiety<sup>4,8</sup>.

The birth process provides an ideal setting for practicing yoga. It allows the woman to connect with her inner voice, turn inward, and enhance her intuition. These emotional experiences during labor are intensified through yoga and meditation, leading to a holistic unity of the body, mind, and spirit<sup>7,8</sup>. Yoga asanas serve as a guide for both the pregnant woman and the fetus during birth. As the birthing process unfolds in stages, the woman listens to her body's cues and transitions to the next asana based on the messages she receives<sup>32</sup>. Deep relaxation and meditation techniques help the woman focus on her breath, enabling her to transcend anxiety and concerns. Consequently, a sense of confidence in the birthing process and trust in the body becomes prominent<sup>8</sup>. While studies on pregnancy yoga and meditation are limited, there is a lack of research exploring their impact on labor outcomes and the health of both the mother and fetus<sup>33</sup>. A study by Mitchell *et al.*<sup>14</sup> found that practicing yoga during pregnancy reduces complications, positively influences weight gain during pregnancy, maternal weight at birth, delivery method, and intrauterine fetal development. In a randomized controlled experimental study conducted in Thailand, the effects of yoga practice on comfort, labor pain, and labor outcomes were investigated<sup>32</sup>. The study included 74 primigravid pregnant women in the second trimester. The experimental group consisted of 37 pregnant women who participated in a six-session yoga course, while the control group (37 pregnant women) received routine nursing care only. The study found that yoga had a positive impact on comfort during labor. Pain scores were similar between the two

groups during the active phase of labor, but the experimental group had lower pain scores. There were no significant differences between the two groups in terms of augmentation, pethidine use during labor, and Apgar scores at 1 and 5 min postnatal<sup>32</sup>.

#### **Yoga and meditation with spiritual dimension at birth**

With the onset of the labor process, which signifies the beginning of the physiological, spiritual, and emotional changes that occur during the birthing journey, a transition to a heightened period of intensified emotions takes place. The onset of labor can be identified through the observation of certain symptoms<sup>24</sup>. Women often experience stress and restlessness at the start of labor, accompanied by a distinct increase in energy compared to other days. From a physical perspective, precursor symptoms include lumbar pain as the fetus begins its descent into the pelvis, pelvic pain, increasing nausea associated with cervical dilation, changes in bowel movements, diarrhoea, intermittent or regular contractions, loss of the cervical canal plug, clear or slightly bloody cervical discharge, and spontaneous rupture of membranes. These symptoms serve as indications that labor has commenced. Alongside these symptoms, as labor progresses, the woman requires additional support to manage uterine contractions and other accompanying symptoms<sup>20,24,30</sup>. During the perinatal period, yoga and meditation practices play a significant role in fostering balance and surrender to the birthing process. The yoga asanas practiced during labor can be adapted to align with the flow of labor and meet the specific needs of the woman. Through these characteristics, prenatal yoga asanas provide physical and spiritual support to both the mother and the fetus<sup>8,34,35</sup>.

Creating a conducive environment with appropriate lighting and music during yoga practices in childbirth can enhance the effectiveness of the practice<sup>36</sup>. During the implementation of yoga asanas, it is important for the woman to minimize talking and allow for an uninterrupted inner journey. Facilitating the woman's detachment from the external world and transition to her own internal world should be supported. When practicing yoga asanas during childbirth, it is essential to proceed slowly and respectfully, honoring the natural process<sup>8</sup>. In antenatal yoga asanas, the practice should commence with breath exercises, and attention should be focused on the breath throughout the process. It is crucial to establish a suitable space for practicing yoga asanas, free from external noise and

distractions, to ensure that the inner journey remains undisturbed. Deep relaxation should be incorporated intermittently, alongside ongoing breath exercises<sup>32</sup>. Particularly, providing support during standing asanas is of utmost importance. Therefore, it is necessary to ensure balance by utilizing support from a relative, a wall, or a bed. When performing floor or seated asanas, it is recommended to use cushions and bolsters to support the legs, elbows, and knees<sup>8</sup>. Following breath awareness, yoga practices should primarily start with asanas that stimulate the root chakra and support the flow of labor<sup>8</sup>. Initiating the practice with first chakra asanas can have a positive effect on the pelvis and uterus, promoting faster labor progression<sup>35</sup>. For instance, the malasana (garland/squatting) pose is commonly used to activate the root chakra. Asanas such as bidasana (four-leg pose) and supported child pose help alleviate waist pain and pressure in the perineal region, which can intensify during the antenatal period, and facilitate the fetus's descent into the pelvis. Standing stretching asanas or using support from a wall or bed can also aid the progression of the fetus in the pelvis and accelerate labor through the gravitational effect. The supported tree pose balances the life energy and guides the woman to continue her journey according to her instincts<sup>8</sup>.

In the literature review, there is very little research that specifically discusses antenatal yoga and its relationship with the birth process. However, a systematic review was conducted to explore studies involving pregnancy yoga practices. Fifteen studies conducted between 2008 and 2013 were reviewed, which included yoga sessions during pregnancy ranging from 4 to 48 h with various content<sup>37</sup>. The study results revealed positive effects of yoga on maternal and fetal well-being during labor, suggesting that these studies can serve as a model to demonstrate the efficacy of yoga practices in pregnancy. It was recommended that future studies should be conducted on a larger scale and for a longer duration to further explore the impacts of yoga on pregnancy and labor<sup>37-48</sup>.

#### **The spiritual impact of Yoga and meditation on mother-infant bonding**

Today, it is widely recognized that the experiences in the immediate moments following birth have a significant impact on the subsequent development of the infant. It is believed that the prenatal experiences of the infant influence both its physiological and spiritual development during and after birth, and that

communication begins not only at the moment of birth, but from the time the infant existed in the mother's womb. Neurobiologists, behavioral scientists, psychologists, and stress researchers have provided evidence suggesting that mental development initiates during the prenatal period<sup>23</sup>. The prenatal period holds great importance for the quality of the mother-infant relationship and even the involvement of the father. Furthermore, it is a critical period for the establishment of secure attachment bonds<sup>46-48</sup>.

Even while still in the uterus, the fetus responds to stimuli on the mother's abdomen. It not only responds to tactile stimuli but also exhibits sensitivity to sound<sup>23,46</sup>. The fetus can recognize the voices of its mother and father and responds to these familiar voices. During labor, the fetus once again responds to the voices of its parents, reaffirming the communication established in the womb. Following birth, the newborn's brain development continues, making the birth and postpartum period crucial for this developmental process<sup>23</sup>.

The fetus begins to discover and learn while still in the uterus. It undergoes learning and development through the experiences it has during the fetal period. The fetus communicates its experiences to the brain through its perceptions, feelings, and the stimuli it receives through its sense organs before birth. Consequently, it forms a memory-related field based on its experiences prior to birth. It exhibits responses to stimuli through its reactions within the mother's womb. For instance, it may startle and contract in response to loud noises, sleep in response to the rocking motion caused by the mother's movements, play with its umbilical cord, and suck its finger<sup>23</sup>.

The sense of touch is the first sensation to develop during the fetal period, specifically the sense of touch on the skin. At around eight weeks of gestation, the fetus can feel when it touches its own lip. As the pregnancy progresses, this sense continues to improve. As the fetus grows, it explores the uterus, umbilical cord, and placenta through touch. With this developing sense, the fetus becomes more responsive to external tactile sensations. Subsequently, the senses of taste and smell begin to develop<sup>23</sup>. The development of eyesight in the fetus starts when it begins to open its eyes around the 18th week of pregnancy. Simultaneously, the 18th week marks the period when the auditory sense starts to develop. The fetus becomes sensitive to sound and can physically

respond to auditory stimuli from this point onward. Along with the development of the auditory sense, the fetus starts to perceive its mother and its journey in the uterus more deeply. It becomes aware of its mother's heartbeat, rhythm, emotional and physical responses, hormonal fluctuations, as well as the sounds produced by internal organs and bowel movements. It also develops a distinct sensitivity to its mother's voice<sup>23</sup>.

Between the 20<sup>th</sup> and 24<sup>th</sup> weeks of pregnancy, the fetus begins to distinguish and recognize all the sounds it hears. After birth, when the newborn is exposed to similar sounds that were present in the uterus, such as a rhythmic heartbeat, the baby responds by becoming calm<sup>23</sup>. Hearing sounds that were familiar during its intrauterine journey evokes a sense of trust and peace specific to that period. Consequently, the newborn finds comfort in hearing those familiar sounds. Communication between the woman and the fetus during pregnancy, such as talking and singing, strengthens this trust and bond. This communication process not only has a relaxing effect on the newborn but also on the woman herself<sup>48</sup>. During the communication between the mother and the infant, both the mother's and infant's heart rhythms become regulated. The fetus also responds to the music it heard during the intrauterine period and can even remember it when the same melody is heard after birth. Additionally, the fetus can feel the sounds it hears during the intrauterine period. The mother's sound waves move and resonate within the pelvis, allowing the fetus to establish a more special and intimate form of communication with its mother<sup>23,47,48</sup>.

The development of various abilities in the fetus before birth demonstrates its remarkable openness to stimuli from the external environment and its readiness to communicate. Furthermore, the fetus also develops affectivity during the intrauterine period. From the 26th week of pregnancy, three-dimensional ultrasound scans have revealed that many fetuses exhibit smiling or crying behaviors<sup>48</sup>. In addition to the communication between the mother and the infant, the fetus is also influenced by the mother's hormones through the circulation of maternal and fetal blood. It can experience stress through the adrenaline hormone secreted by the mother when she is afraid or stressed, and it can experience happiness and love through the secretion of oxytocin and endorphins by the mother when she feels happy. By

sensing the fluctuations in maternal hormones, the fetus can perceive and learn different emotions based on its mother's emotional state<sup>23,48</sup>.

A woman plays a significant role in fostering emotional competence in the fetus during the intrauterine period<sup>23</sup>. By providing a positive pregnancy experience with high self-confidence and awareness, she teaches the fetus how to be strong and cope with challenges. Therefore, the communication and interaction between the mother and the fetus that begins during the intrauterine period are of great importance. The earlier and healthier the communication and interaction that the mother establishes with the fetus, the stronger the sense of maternity and bonding process will be<sup>23,48</sup>.

In order to promote this perceptual development process, it is important to encourage mothers to initiate mother and infant communication and emphasize its importance during birth preparation classes offered during pregnancy<sup>23</sup>. Research has shown that attending birth preparation classes, avoiding smoking, alcohol, and other addictions, maintaining a proper and balanced diet, following a regular sleep pattern, and engaging in healthy lifestyle activities are effective in establishing a strong mother and infant attachment<sup>49</sup>. Additionally, practices such as yoga and meditation during pregnancy have been found to be highly effective in strengthening mother and infant communication. In a study, it was found that pregnancy yoga and relaxation practices contribute to the enhancement of mother and infant attachment<sup>47,48</sup>.

Engaging in yoga poses and practicing mother-infant communication meditation that focuses on observing the perceptual process of the fetus during the intrauterine period can indeed support the development of mother and infant attachment. These practices can be tailored to align with the different stages of pregnancy. During the first trimester, mother-infant communication meditation can be implemented to strengthen the sixth chakra (ajna) and enhance the intuitive area. This practice involves accepting and embracing the spirit of the fetus while concentrating on love and healing energy towards the infant. It aims to establish a connection and foster the development of the two souls, strengthening the heart chakra and laying the foundations for attachment<sup>8,32,36</sup>. Between the 16th and 34th weeks of pregnancy, ongoing support for communication and attachment can be provided through mother-infant communication meditation. This practice involves taking a journey to the mother's

womb, combining the two souls, and strengthening the bond between them. It helps the mother and fetus feel secure, supports fetal development, and transmits messages of love and excitement, creating anticipation for the day of birth<sup>8</sup>. During the 34<sup>th</sup> to 40<sup>th</sup> weeks of pregnancy, mother-infant communication meditations can focus on breath and preparation for birth. This involves an inner journey accompanied by soft music, with a focus on supporting the infant through the birthing process. Guiding the fetus's journey at birth along with harnessing the existing power within the mother can have a positive impact on the birthing experience, influenced by the strengthened mother-infant communication developed throughout the pregnancy journey<sup>8</sup>.

#### **Pregnancy yoga in midwifery: Enhancing maternal care and well-being**

Complementary Alternative Treatment (CAT) practices have been integrated into healthcare services in many countries due to their alignment with the philosophy of midwifery and their applicability in care. In the field of midwifery, CAT practices are employed during the pregnancy and birth processes to complement medical treatments. These practices not only enhance the quality of care but also increase the satisfaction of healthcare professionals and pregnant women. They support professional autonomy, respect women's preferences and autonomy, and prioritize a woman-oriented approach. Countries such as China, Korea, Germany, and Austria have adopted CAT practices in their care processes, incorporating modalities such as massage, aromatherapy, music, hypnosis, acupuncture, acupressure, reflexology, and yoga into maternity units, resulting in increased satisfaction among pregnant women<sup>46-48</sup>.

In the realm of midwifery, the holistic evaluation of patients or healthy individuals is of great importance in the diagnosis and provision of care. This approach aims to improve the quality of service and promote health<sup>48</sup>. Advancements in technology and a shift away from traditional practices have paved the way for innovative approaches in midwifery care. Factors such as the desire for a healthy pregnancy, the preference for a natural birthing experience, pregnant women's increasing demand for autonomy and responsibility in their own healthcare processes, and the positive impact of CAT practices on the psychological, mental, and physical well-being of pregnant women have contributed to the growing interest and demand for these practices<sup>44,46,48</sup>. In our country, this rising

interest and utilization among pregnant women have led midwives and gynaecology nurses to incorporate CAT practices into their care processes<sup>46,48</sup>.

CAT practices in midwifery care can be classified into mind and body-oriented, manipulative and body-oriented, energy-oriented, biological-oriented, and alternative medical systems. These methods encompass a range of herbal, behavioral, cognitive-intellectual, and tactile approaches<sup>41-48</sup>. Pregnancy yoga, as one of the behavioral and body-mind-based methods, holds significant importance in midwifery and gynecology care due to its positive impact on pregnancy-related complaints, posture disorders, life energy, and the promotion of mother-infant attachment<sup>44-48</sup>.

### Conclusion

Yoga is known to support the healing process, enhance quality of life, and minimize physical disturbances. It has become an effective practice in promoting and maintaining overall health. Pregnancy yoga specifically plays a significant role not only in pregnancy but also in midwifery care, as it has positive impacts on the birthing process. Moreover, yoga can be effectively implemented in women's health across all stages of life, including gynaecological conditions such as infertility, menopause complaints, premenstrual syndrome (PMS), dysmenorrhea and gynaecological cancers<sup>40-48</sup>. For midwives to incorporate pregnancy yoga into their care during pregnancy and the labor process, they need to receive proper training and enhance their knowledge in this field. Acquiring training in pregnancy yoga from specialized academics and learning the practices would enable them to appropriately guide pregnant women and integrate yoga into their care processes. Additionally, keeping up with scientific studies in this area would contribute to the improvement of care and practices. It is also important to establish necessary legal regulations to clarify the roles of practitioners and identify authorities in the field of pregnancy yoga.

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### Conflict of Interest

None declared.

### Authors' Contributions

Research authors contributed equally. TYE made substantial contributions to conception and design, or

acquisition of data, or analysis and interpretation of data; GR involved in drafting the manuscript or revising it critically for important intellectual content; gave final approval of the version to be published.

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