

The Importance of Pilates for Pregnant Women and Principles of Practice

Yeşim ANIK ÇANKAYA

Karamanoğlu Mehmetbey University

Musa ÇANKAYA

Necmettin Erbakan University

To Cite This Chapter:

Çankaya, Y. A., & Çankaya, M. (2025). The importance of pilates for pregnant women and principles of practice. In S. Demir, F. N. Takı, & Y. Uzun (Eds.), *Current studies for sustainable health* (pp. 208–230). ISRES Publishing.

Introduction

Pregnancy is a critical period in a woman's life when her biopsychosocial balance and her roles in the family and workplace change, and the parent-child relationship between mother and baby is established (Ünver & Aylaz, 2017). Pregnancy is a unique and complex stage in a woman's life. The associated changes occur not only at the biological and physiological levels but also at the psychological and physical levels. Changes in psychological functioning continue during pregnancy and into the postpartum period (Hussain & Bhandari, 2025). The physiological changes of pregnancy are caused by hormones secreted by the placenta. These changes result in a series of adaptations affecting all physiological systems. Sufficient oxygen and nutrients are delivered to both the mother and the developing fetus. These physiological changes cause alterations in biochemical test results (Gangakhedkar et al., 2021).

Pilates is a body-conditioning program that involves movements performed on the floor using body weight or accessories, such as exercise balls, resistance bands, exercise rollers, magic circles, and overballs (Ferraz et al., 2023). It can also be performed using specialized equipment, such as the Reformer, Cadillac, Wunda Chair, and staircase, to increase strength and endurance. Joseph Pilates developed the Pilates method in the 1920s. The original name of the Pilates method, "Contrology," reflects the method's emphasis on controlling posture and movement (Anderson, 2024). The traditional principles of Pilates exercise include centering, concentration, control, precision, flow, and breathing (Malhotra et al., 2025).

Psychological and Physical Changes During Pregnancy

During pregnancy, changes occur in physical appearance, emotional state, and sexuality (Hussain & Bhandari, 2025). Pregnancy is generally considered a period when women are more motivated to maintain a healthy lifestyle, including participating in physical

activities and improving their health. There is also evidence that physical activity during pregnancy can improve psychological well-being (Atkinson & Teychenne, 2022; Boutib, et al., 2021). These changes make it difficult for women to adopt and maintain a healthy lifestyle during this period. These changes are often associated with common mood swings such as indecision, anxiety, fatigue, exhaustion, lethargy, melancholy, and elation. As body image, emotional state, and sexuality change during pregnancy, women's positions and roles also change (Hussain & Bhandari, 2025). Together with many established social and cultural beliefs about pregnancy, these changes create significant challenges for women in adopting and maintaining regular exercise during this period (Boutib, et al., 2021).

Regular physical activity provides significant benefits for both the mother and the fetus. Benefits for the mother include improved cardiovascular function, limited gestational weight gain, reduced musculoskeletal discomfort, fewer muscle cramps, and reduced lower-extremity edema, improved mood, and alleviation of gestational diabetes and gestational hypertension (Meyerhoff & Belew, 2024). Benefits for the fetus include reduced fat mass, improved stress tolerance, and increased neurological maturation. Although few studies directly examine the effects of physical activity on labor and delivery, evidence indicates that physical activity shortens labor duration and reduces cesarean delivery rates in women with normal pregnancies (Melzer et al., 2010).

Physical activity is a safe and effective way for healthy pregnant women to reduce the risk of adverse health outcomes. Physical activity can be defined as any bodily movement produced by skeletal muscles that requires energy expenditure. This includes activities in various areas such as recreation, sports, work, and household chores. Government agencies around the world, including those in Canada and the United States, recommend that all pregnant women participate in physical activity throughout their pregnancy. Healthy pregnant women are advised to engage in 150 minutes or more of moderate-intensity physical activity per week (Daşikan et al., 2019). Physically active women report improvements in physical endurance and mood, as well as reductions in nausea, fatigue, and stress levels. Women and infants also gain long-term benefits from an active lifestyle; they have been observed following active pregnancies. Evidence suggests that pregnancy offers an opportunity to promote positive health behaviors (Erkek & Altınayak, 2024). This opportunity has been described as a “teaching moment” in a woman's life because her perception of risk has increased. Furthermore, strong emotional responses and the redefinition of social roles and responsibilities tend to motivate pregnant women to adopt positive health behaviors such as physical activity. Despite these benefits and the opportunities offered during pregnancy, physical activity levels are generally lower among pregnant women than in the general population (Currie et al., 2013). Physical activity can also be expressed in METs, which represent multiples of an individual's

resting metabolic rate. MET scores represent the metabolic-equivalent intensity levels of activities. Moderate-intensity activity is classified as 3–5 METs. Therefore, 150 minutes of moderate-intensity activity is equivalent to 7.5-12.5 MET hours per week (Garber et al., 2011).

Australia's physical activity guidelines for pregnancy and the postpartum period recommend pelvic floor muscle exercises to reduce the risk and severity of pelvic floor muscle disorders (Walsh et al., 2025). Physical activity is associated with health benefits for people of all ages. Physical activity throughout pregnancy is safe and beneficial for both women and fetuses (Yang et al., 2022). Regular physical activity in healthy pregnant women is associated with improved cardiovascular health and with reduced risks of gestational hypertension, preeclampsia, gestational diabetes, and excessive weight gain during pregnancy (Gao et al., 2020). Pregnant women who are physically active or who exercise regularly are less likely to experience urinary incontinence, postpartum weight gain, and symptoms of depression. Strong scientific evidence shows that physical activity during pregnancy is not associated with low birth weight, stillbirth, preterm birth, premature rupture of membranes, neonatal death, neonatal hypoglycemia, birth defects, or induction of labor. Furthermore, exercising during pregnancy reduces the risk of chronic diseases such as obesity, type 2 diabetes, and cardiovascular disease in both women and their children (Yang et al., 2022).

Exercise during pregnancy is known to have benefits such as regulating the circulatory and digestive systems, helping the mother control her weight, supporting the muscle activity required for childbirth, and accelerating postpartum recovery. It can also prevent back pain, foot edema, varicose veins, and hemorrhoids. Systematic exercise during pregnancy and after childbirth plays an important role in functional treatment. Exercise during pregnancy is recommended to restore the tone of the vaginal and perineal muscles, reduce edema in the perineal region, improve circulation, prevent stress incontinence and abdominal muscle tension, thereby preventing abdominal sagging and back pain (Ünver & Aylaz, 2017). Strengthening the back and spine muscles is important for pregnant women. Strengthening the abdominal and pelvic muscles facilitates delivery. These muscles can be strengthened with exercises performed at home (Mens et al., 2000). For example, the pregnant woman lies on her back with her knees slightly bent. She sits up, attempts to touch her feet with her hands, then lies back down (a sit-up). This movement should be repeated 10 times. This movement strengthens the abdominal muscles. In another exercise, the pregnant woman lies on her back, knees slightly bent, and contracts her hip muscles as if trying to stop the flow of urine. This exercise strengthens the muscles she will use during childbirth. This strengthening movement is performed using Kegel exercises, which involve contracting and releasing the pelvic muscles and can also be considered a pushing movement. For example, the hip muscles are slowly contracted

and held for 5 seconds, then are slowly released. This movement is repeated 25 times and performed twice daily (Ağaoğlu, 2015).

The Role of Pilates During Pregnancy

Internationally, Pilates is recognized as an important exercise for improving physical, psychological, and motor functions. This exercise program consists of a series of low-impact exercises that build strength and flexibility (Das & Bandyopadhyay, 2023). Because it is an exercise performed using one's own body weight, it carries the lowest risk of contraindications. Adopting a standardized breathing technique during Pilates practice is essential. It helps activate the deep stabilizing muscles, especially the transverse abdominis, in relation to the pelvis. This increases pelvic and trunk strength. Pilates movements are adapted to the physiological changes of pregnancy. Regular exercise has been shown to strengthen the pelvic floor muscles and improve their structural function. Pelvic floor exercises are part of modern Pilates (Szumilewicz et al., 2019). Pelvic floor exercises during pregnancy have been shown to prevent prolonged second-stage labor in approximately one in eight women (Salvesen & Mørkved, 2004). Pregnant women practicing Pilates also use diaphragmatic breathing techniques, which help mothers prepare for childbirth. The breathing technique used in Pilates prepares the mother to use this method during childbirth. Pilates, by developing the ability to use the abdominal and pelvic floor muscles, improving flexibility, and promoting proper breathing, facilitates the birth process (Ghandali et al., 2021).

Pilates exercises improve postural stability in pregnant women, reduce fear of childbirth, and increase physical readiness. It alleviates back pain and improves pelvic alignment. Pilates also improves sleep quality and life satisfaction, lowers stress levels, and enhances birth outcomes. Therefore, incorporating Pilates into prenatal care programs may support maternal and newborn health and improve the overall pregnancy experience (Aman et al., 2025).

Physiological Effects of Pilates During Pregnancy

Exercise has traditionally been used as a non-invasive treatment for patients with obesity and depression, and its effectiveness has been demonstrated in various studies (Meneghin et al., 2020; Langoni et al., 2019). Studies of molecular mechanisms underlying the antidepressant effects of exercise have shown that exercise promotes activation of tryptophan in the brain, thereby increasing serotonin release and, by reducing insulin resistance, preventing depression (Kim & Hyun, 2022).

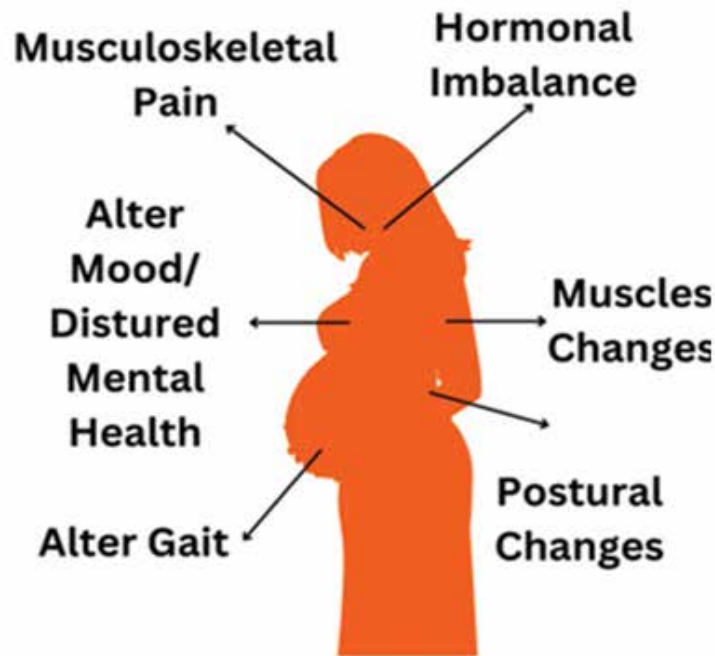
Changes in Posture and Spine

Postural changes during pregnancy shift the center of gravity forward as the uterus

grows, leading to increased lumbar lordosis (an exaggerated inward curvature of the lower back). This compensatory mechanism not only helps maintain balance, but can also cause back pain by placing more stress on the lumbar spine (Figure 1). As pregnancy progresses, the transverse diameter of the rib cage increases and the diaphragm elevates. Increased pressure on the ribs due to fetal growth causes an increase in the subcostal angle. Thoracic Kyphosis In some cases, increased thoracic kyphosis (outward curvature of the upper back) develops to compensate for lumbar lordosis. This causes discomfort in the upper back, neck, and shoulders. The pelvis tilts forward. This also causes increased lumbar curvature and increased tension in the lower back muscles (Aman et al., 2025).

Figure1

Pregnancy and its related changes



Changes in Muscle Strength and Flexibility

As pregnancy progresses, loosening of the pelvic ligaments and increased abdominal weight lead to gait imbalance (Aman et al., 2025). This altered gait pattern increases the load on the lower extremities, causing discomfort in the hips, knees, and feet. The combination of joint laxity, shift in the center of gravity, and weight gain also contributes to walking instability, increasing the risk of falling (Artal & O'Toole, 2003; Cakmak & Erkin, 2011). During pregnancy, diastasis recti is common due to stretching of the abdominal wall to accommodate the growing fetus. This can weaken the abdominal muscles and lead to back pain and instability. Pregnant women often experience muscle cramps, especially in the legs. These cramps are caused by changes in circulation, increased pressure on the nerves, or electrolyte imbalances (Aman et al., 2025; Ho et al., 2009).

Strengthening the Pelvic Floor Muscles

The uterus is primarily supported by the pelvis and associated muscles (Chaudhry et al., 2023). Like other tissues, pelvic floor muscles and connective tissues are also affected by secreted hormones. However, increasing uterine weight places greater demands on the pelvic floor, making pelvic-floor muscle exercises essential during pregnancy. Some parts of the pelvic floor are controlled by the autonomic nervous system; these parts can also be affected by exercise and respond strongly to stress levels. Pelvic floor exercises should be prioritized and performed daily (Okeahialam et al., 2022).

Research shows that many young women today —often due to work-related factors— and women who have previously given birth suffer from weak pelvic floor muscles (Gümüşsoy, et al., 2021). Mothers who have given birth to babies weighing more than four kilograms or who have had forceps- or vacuum-assisted deliveries are at higher risk of pelvic floor problems (Kömürcü & Uğur, 2017). Strong pelvic floor muscles recover more rapidly after childbirth and demonstrate greater resilience. This helps prevent urinary incontinence and minimizes the risk of problems associated with back pain and pelvic instability. Both weak pelvic floor muscles and pelvic floor tension can cause problems. Pelvic floor weakness or dysfunction in women is associated with both structural and functional consequences, including urinary incontinence, fecal incontinence, pelvic organ prolapse, dyspareunia, and sexual dysfunction. One of the main risk factors associated with pelvic dysfunction is the reproductive process, including pregnancy and childbirth (Feria-Ramírez et al., 2021; Theodorsen et al., 2024). A Pilates exercise program is recommended to support pelvic floor muscle health before and after childbirth (Walsh et al., 2025). These recommendations are also inspired by the basic principles of exercise science and clinical reasoning (Walsh et al., 2025).

During pregnancy, abdominal and pelvic floor muscles should be exercised in a manner that does not cause diastasis recti abdominis. This promotes neural adaptations, supports muscle hypertrophy, and increases functional strength. It involves deep core activation and co-contraction of the pelvic floor muscles. Interventions that include deep core activation, particularly those that promote the synergistic contraction of the pelvic floor muscles, the transversus abdominis, and the diaphragm, support lumbopelvic stability and pelvic floor function (Walsh et al., 2025; Atkın et al., 2025).

Education and supervision

Because many women struggle to contract their pelvic floor muscles correctly after childbirth, education and supervision by trained healthcare professionals (e.g., women's health physical therapists or accredited exercise physiologists) may help ensure correct technique and improve educational outcomes (Walsh et al., 2025).

Personalized exercise prescription

Exercise interventions should be planned according to individual needs, especially considering common accompanying musculoskeletal health problems such as pelvic floor dysfunction, pelvic girdle pain, low back pain, and rectus diastasis (Örnek et al., 2023).

Effects of Pilates on Respiratory and Circulatory Systems

The growing popularity of Pilates worldwide has led to an increase in research on its effects (Souza et al., 2021). Pilates training has been shown to improve cardiovascular function in individuals with various pathologies such as chronic obstructive pulmonary disease, chronic kidney disease, ankylosing spondylitis, and cystic fibrosis (Sarmento et al., 2017). It has been observed to increase respiratory muscle strength and respiratory volume in healthy populations of different ages (Cancellero-Gaiad et al., 2014). This method has also been shown to improve cardiovascular fitness in overweight or obese individuals and improve average heart rate, respiratory exchange ratio, and oxygen equivalent in sedentary individuals (Rayes et al., 2019).

Many pregnant women experience dyspnea, particularly during the second and third trimesters, because of the elevation of the diaphragm by approximately 4 cm (Petrenko et al., 2023). Some expectant mothers experience short breath. In some cases, the baby's movements and kicks toward the diaphragm can cause breathlessness and reduced lung expansion. Pilates increases lung capacity, reduces shortness of breath, promotes relaxation, and creates more space for the baby. The correct breathing techniques learned through clinical Pilates training relax and comfort the mother during contractions, muscle cramps or spasms, and discomfort caused by the baby's movements, thereby increasing her confidence during childbirth (Karapinar & Acar, 2023). This relaxation and loosening in the mother allow the mother's body to move normally and reduce the likelihood of hyperventilation and injury during delivery (Karapinar & Acar, 2023).

Pilates Exercises According to Pregnancy Stages

First Trimester (0–12 weeks): Risks to be aware of, threat of miscarriage, light exercise

The first three months of pregnancy constitute the riskiest period. It is important to start Pilates during this period. During this period, levels of the relaxation hormone increase, leading to joint laxity; therefore, exercises that place strain on the joints should be avoided (Parker et al., 2022). As the baby grows, the body's center of balance changes concurrently with hormonal changes (Bouariu et al., 2022). During this period, movements should be slowed, and the body's signals should be heeded. The focus should be on light breathing, posture, and awareness. Overheating and intense abdominal exercises should be avoided. Fatigue and nausea may limit activity, so pregnant women should constantly

monitor their condition (Meyerhoff & Belew, 2024).

During this period, the fetus measures approximately 6–7 centimeters in length, weighs a few ounces, and resembles a miniature human (Pelz et al., 2025). Some reflexes are present. Heartbeats can be detected by ultrasound at six weeks' gestation. Physical symptoms during this period include fatigue, nausea, occasional vomiting, breast enlargement and increased breast sensitivity, mild weight gain, and increased urinary frequency. Psychological symptoms may include excitement, fear, and confusion. The fetal brain develops for up to six weeks; some neural tube defects occur during this period. Some causes have been linked to overheating during intense exercise (Bouariu et al., 2022). Most women do not realize they are pregnant until around the eighth week. By that time, the fetus is almost fully formed. During this trimester, the focus should be on establishing a routine that will support the person throughout the remainder of the pregnancy.

The first trimester of pregnancy is often an exciting yet intense period for expectant mothers. Stress can arise from the physical demands of the rapidly growing placenta and fetus, as well as from the psychological challenges of adapting to pregnancy (Wu et al., 2021). The risk of birth defects and miscarriages is highest during the first trimester of pregnancy. During this trimester, the fetus cannot regulate its own body temperature and is therefore dependent on the mother's body temperature. Expectant mothers should be cautious if they exercise intensely, engage in endurance training, or exercise in high temperatures during this period. However, body temperature changes significantly during pregnancy (Sexton et al., 2021). Body temperature typically decreases at the beginning of pregnancy. Hormones secreted during pregnancy increase cutaneous blood flow, leading to elevated skin temperature in certain body regions (Filipec & Đurin, 2025). This change in skin temperature increases body heat loss. Additionally, pregnancy lowers the body's sweat threshold. Pregnant women begin sweating earlier, thereby improving the body's cooling mechanism. Studies have shown that pregnant women who exercise cope better with heat than do non-pregnant women. Therefore, the risk is extremely low if long and intense training sessions and exercise in very hot weather are avoided.

Breathing and relaxation exercises

Breathing is one of the most fundamental functions of the human body. The way you breathe significantly affects how your body functions and, ultimately, your health and well-being. Joseph Pilates called proper breathing “fundamental” (Osar & Bussard, 2016). He believed that increased blood flow would activate the cells in your body and remove waste products associated with fatigue. Pregnant women need to learn to perform breathing and relaxation exercises correctly to make the process more comfortable. Sample exercises are provided for the first trimester (0–12 weeks) (Figure 2).

Figure 2

1st Trimester Sample Plate Exercises



Second Trimester (13–27 weeks): Balance and posture-focused exercises

The third through sixth months of pregnancy are the most comfortable for pregnant women. Abdominal muscle exercises and pelvic floor exercises should be started during this period (Liu et al., 2022). Supports, such as small Pilates balls, can be used during exercises. During this period, when the baby begins to grow and gain weight, changes in your body become more pronounced. Back and spine pain may begin during this period. Avoid overly strenuous movements. The second trimester is the most suitable period for regular exercise (Ribeiro et al., 2022). Energy levels return, nausea decreases, and Pilates movements can be performed safely with appropriate adjustments. As the

umbilical region begins to enlarge, positions that normally require lying on your back for long periods are adopted. Exercises performed on your hands and knees, while sitting, or while lying on your side are ideal. Pelvic floor and abdominal stability exercises were initiated (Nipa et al., 2022).

During the second trimester, the mother generally feels better and experiences increased energy (Krzepota et al., 2018). For most women, morning sickness has subsided. However, some women experience nausea throughout the entire nine months. This can be quite challenging because it is sometimes difficult to eat enough. Therefore, fatigue and reduced energy levels become contributing factors. As the uterus rises into the abdominal cavity, the pregnancy becomes more noticeable. This causes round ligament pain. The mother feels the baby move at around 18–22 weeks. Normal weight gain by the end of this trimester ranges from 8 to 12 kg (Drehmer et al., 2013). Psychological symptoms are as follows: the mother is more relaxed about the pregnancy and begins to feel excited. There is generally a greater sense of well-being during this period.

The fetus is approximately 35 cm long and weighs 0.5–1.0 kg. By the end of this trimester, the mother looks quite pregnant (Islam et al., 2024). She may complain of feeling large, but this is not comparable to how she will feel at the end of her pregnancy. At about five months' gestation, the uterus typically extends beyond the pelvic cavity, sometimes causing round ligament pain. The round ligament helps the uterus attach to the pelvis. When the uterus expands rapidly, it stretches these ligaments, causing some pain. Stretching the hips may provide some relief. Breathing becomes shallower, and the rib cage begins to expand (Ejikeme et al., 2025). Back and lateral chest breathing techniques are used to stretch the intercostal muscles, allowing the uterus to enlarge and shift upward. Women experiencing their second or subsequent pregnancy reach this stage more quickly than first-time pregnant women. Supine hypotension syndrome becomes a problem during this trimester. This occurs when the inferior vena cava is compressed while the patient is supine (Hendem et al., 2023). Symptoms in the mother include shortness of breath, dizziness, and nausea. This is a period during which blood flow to the fetus is reduced. Turning the mother onto her side corrects the syndrome. If the mother has no obvious signs of compression, short periods of supine exercise are permitted. This can be alternated with side-lying exercises. The mother may begin to experience back pain at this stage. Pelvic exercises are one way to alleviate this problem.

Basic exercises for the second trimester (Figure 3)

Neutral/anterior pelvic alignment

At this point, the pelvis begins to tilt forward. It tries to maintain balance with the surrounding muscle groups.

Lateral flexion

This exercise is included in the program to help maintain intercostal muscle tone and accommodate the expansion of the rib cage.

Thoracic extension

Strength in the upper body and arms continues to be maintained. As the pelvis moves forward, the body tends to lean backward to counteract gravity.

Obliques and transversus

These become increasingly tense at this point. Continue performing light exercises that incorporate breathing techniques.

Pelvic floor

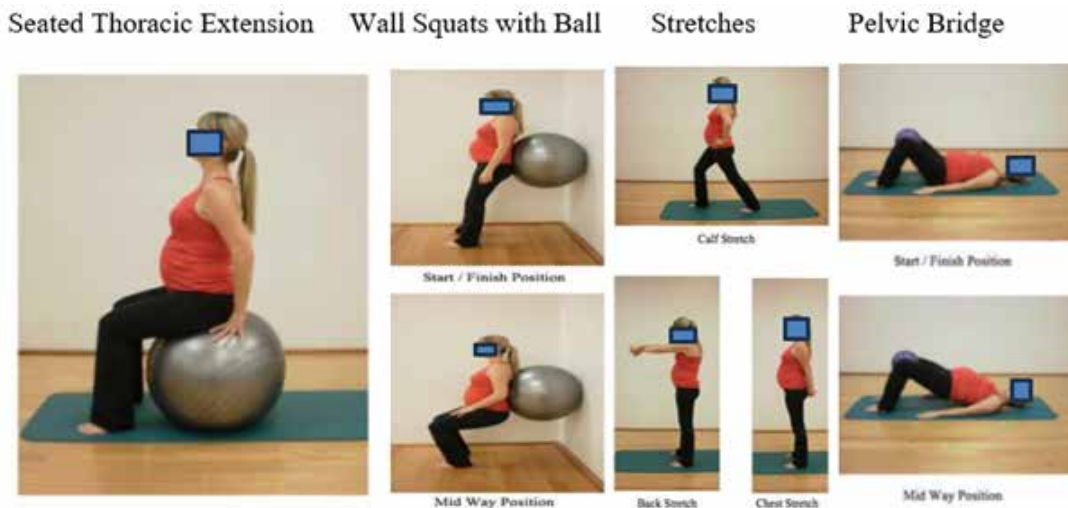
Continue with the pelvic floor series and related exercises.

Breathing

Use lateral and posterior chest breathing to stretch the intercostal muscles. When exhaling, try to release your body rather than tensing it.

Figure 3

2nd Trimester Sample Pilates Exercises



Third Trimester (28–40 weeks): Relaxation, breathing exercises, and preparation for childbirth

During the final three months of pregnancy, focus on exercises that facilitate delivery. Focus on maintaining gentle mobility, balance, and comfort. Avoid deep stretching exercises that put pressure on the abdomen or require strength. Physical Symptoms in the Third Trimester: As the baby's weight and height increase, the mother may begin to tire more easily (Aman et al., 2025). The infant will require increased caloric intake during

this period to mobilize fat reserves. Swelling of the hands, ankles, and feet is likely to occur. Shortness of breath and faintness may occur. Braxton Hicks contractions may occur. Psychological Symptoms: The mother may feel hopeless and wish the pregnancy to end as soon as possible. She may experience excitement and fear of childbirth. Towards the end of this trimester, she may experience a feeling known as the “nesting instinct” (Kersting et al., 2009).

Immediately before birth, the baby is 40-55 cm long and weighs 3.3-4 kg (Subhan, 2013). Most women experience fatigue during the third trimester; therefore, exercise must be adjusted accordingly. Infants are currently experiencing rapid growth. Balance is impaired because the center of gravity has changed significantly. Although the scientific literature provides no details about falls, an instructor should pay particular attention to clients who are in unstable positions. Exercising up to shortly before delivery is not harmful to pregnant women. However, many women stop earlier because any additional movement becomes excessively tiring and uncomfortable. Towards the end of their pregnancy, women can plan the program that will be implemented after childbirth. Postpartum exercises to strengthen the deep abdominal muscles and the pelvic floor can be started immediately after childbirth.

Blood Pressure

Blood pressure is a measure of the pressure exerted by blood on the walls of the arteries. Standing can temporarily affect blood pressure. For example, if a pregnant woman stands for prolonged periods, blood may pool in the lower extremities, causing dizziness. During pregnancy or childbirth, when a woman lies on her back, maternal blood pressure may fall owing to the weight of the uterus compressing the aorta and inferior vena cava (or iliac veins) (Salles et al., 2015). The aorta carries oxygen-rich blood from the heart to the systemic circulation, while the vena cava carries oxygen-depleted blood from the lower half of the body back to the heart. Both blood flows pass through the spinal canal and can be affected by the additional weight of the uterus when lying on your back.

This can impede blood flow to the uterus and heart. Hypotension (a drop in blood pressure) should be monitored while lying on your back.

Balance

Women typically gain 25–30% of their pre-pregnancy body weight during pregnancy. Most of this weight is concentrated in the abdominal area, shifting the center of gravity. Additionally, pregnant women have relatively higher estrogen and lower testosterone levels. Testosterone facilitates balance, spatial orientation, and hand-eye coordination. Pilates-based exercises can help regulate hormonal balance, limit the turmoil caused by

physical and emotional changes, and thus contribute to the expectant mother's physical and emotional relaxation (Sancar et al., 2021).

Fluid Retention

Approximately 70% of the human body is water. During pregnancy, hormone secretion causes the walls of the blood vessels and lymphatic vessels to relax, significantly increasing the volume of fluid in the blood and body tissues, including cells. As a result, toward the end of pregnancy, a woman's body can retain several liters of fluid. About half of the weight gained during pregnancy is usually attributable to excess fluid, which is distributed throughout the body. This fluid is found in the blood, organs, tissues, and muscles, where it aids pregnancy (Demir, 2022). Pilates-based exercises can help prevent swelling (edema) resulting from interstitial fluid accumulation in the subcutaneous tissue by promoting circulation and redistribution of excess fluid.

Basic exercises for the third trimester

Emphasis should be placed on exercises that stretch the pelvic floor muscles. At this stage, breathing is usually shallow and confined to the chest cavity. You should try to take deep abdominal breaths.

Pelvic mobility

Pelvic tilts, hip circles, and bridge movements are used to maintain flexibility in this area.

Spine and pelvic stability

Light abdominal exercises should be performed in conjunction with breathing.

Stretching

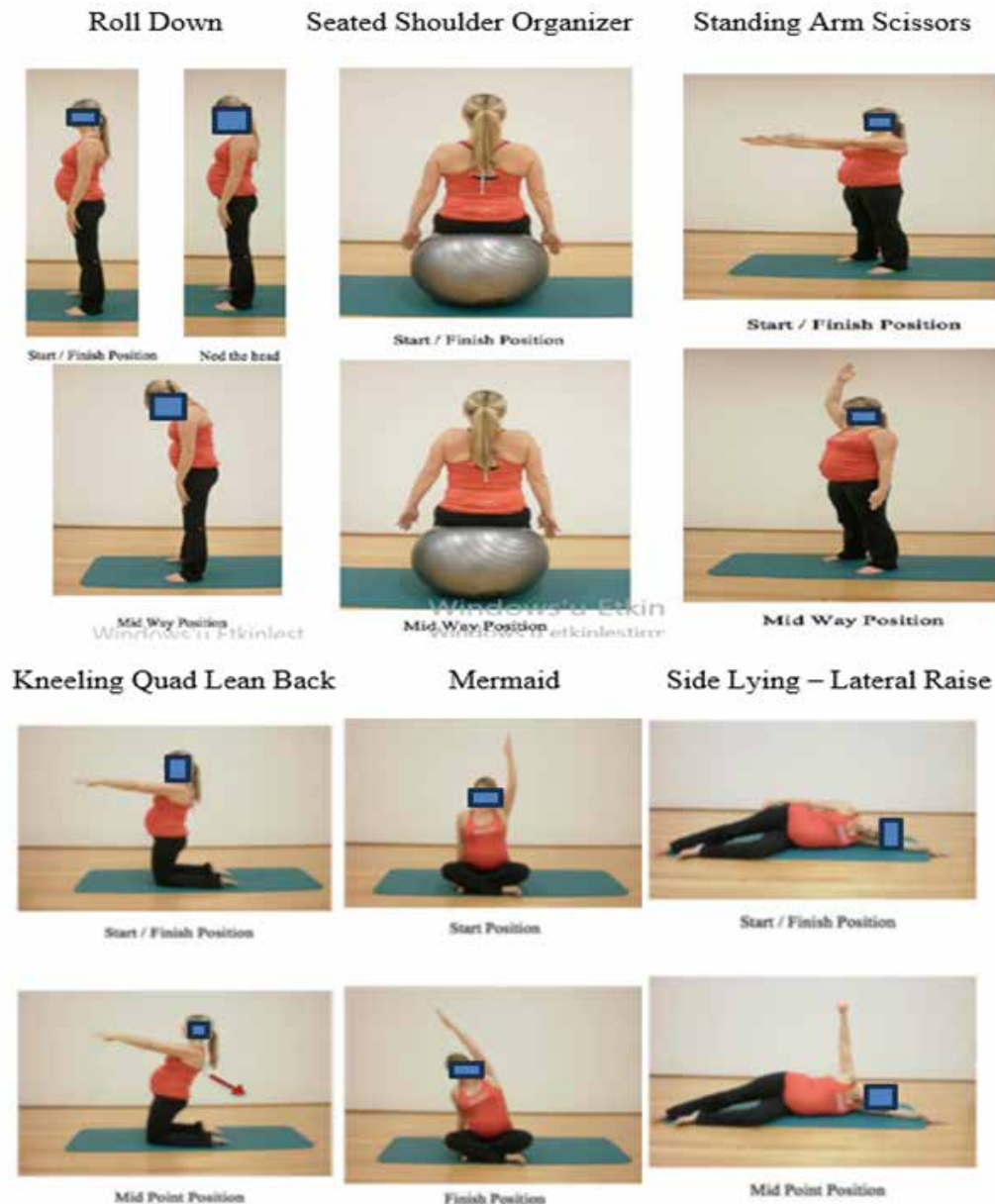
Focus on the inner thighs, hips, spine, and pelvic floor.

Pelvic floor

It is important to stretch and relax in this area.

Breathing

Focus on deep abdominal breathing to promote relaxation and improve concentration. Breathing, relaxation, and visualization are particularly important throughout this trimester.

Figure 4*3rd Trimester Sample Plate Exercises***The Benefits of Pilates for Pregnant Women**

Exercise or physical activity has positive effects during pregnancy, childbirth, and the postpartum period (Malhotra et al., 2025). Prenatal exercise is vital for ensuring optimal health for both the mother and the unborn baby. However, increased encouragement and recommendations for physical activity are needed, especially in developing countries (Yimer et al., 2024). In the past, pregnant women were generally advised to rest and reduce physical activity. However, in 1985, the American College of Obstetricians and Gynecologists published recommendations for physical activity during pregnancy. This led to a substantial shift in public perceptions regarding exercise during pregnancy (Davenport, 2020). Health professionals recommend that low-risk pregnant women begin or continue aerobic and progressive resistance training before conception, during

pregnancy, and in the postpartum period (Yimer et al., 2024; Davenport, 2020).

Studies have shown that the Pilates approach provides benefits for both healthy and unhealthy individuals, including improvements in posture, abdominal, pelvic, and muscular stability (Wells et al., 2012). This technique aims to improve muscle coordination by increasing the flexibility of hypertrophic muscles and by strengthening the weakest muscles. This allows the user greater control over bodily movements without risking injury to their back or joints. Breathing and pelvic floor muscle contraction techniques are part of contemporary Pilates exercise routines. Breathing is synchronized with the contractions of the pelvic floor muscles, and the abdominal muscles are activated simultaneously in various situations (Pedriali et al., 2016). Pilates strengthens the abdominal muscles and improves respiratory muscle function, thereby preventing abdominal muscle weakness and disorders of respiratory mechanics. Since the exercises are performed in conjunction with pelvic floor muscle contractions, Pilates strengthens the pelvic floor muscles (Malhotra et al., 2025).

Pilates prepares the abdomen and pelvic floor for childbirth. Therefore, considering the advantages of Pilates exercises during childbirth, abdominal breathing during Pilates helps women cope with contractions more easily, push the baby out more effectively, have a more comfortable birth, and sustain fewer perineal tears (Güder, 2021). Pilates reduces back, waist, and hip pain, increases body awareness in preparation for childbirth, reduces stress and anxiety, and facilitates postpartum recovery. Pilates improves physical conditions by reducing the progression of abdominal diastasis, decreasing fatigue, maintaining anthropometric and hemodynamic parameters, increasing abdominal and pelvic floor strength, improving hamstring flexibility, enhancing lumbopelvic stabilization, improving posture, functional capacity, and quality of life (Mendo & Jorge, 2021).

Points to Note

Some restrictions have been recommended for pregnant women regarding Pilates and exercise in general. For example, it is recommended that abdominal exercises be modified to prevent significant separation of the rectus abdominis muscle (Carlstedt et al., 2021). Pregnant women are also advised to avoid prolonged exercise in the supine position to prevent obstruction of venous return from compression of the inferior vena cava by the growing uterus. Absolute contraindications for aerobic exercise in pregnant women include cervical insufficiency, persistent bleeding, and ruptured membranes. Relative contraindications include severe anemia and poorly controlled type I diabetes. Therefore, it is recommended that pregnant women undergo routine screening before starting exercise to assess general health, medical and obstetric risks, and physical capacity (Mazzarino et al., 2018).

References

- Ağaoğlu, S. (2015). Women's health and exercise. *Journal of Sports and Performance Research*, 6(2), 67-72.
- Aman, I., Zutshi, K., Asif, M., Khan, G., Khan, H., & Saifi, S. (2025). Role of Pilates on Pregnancy and Its Related Problems. *Archives of Medicine and Health Sciences*, 13(2), 260-264.
- Aman, I., Zutshi, K., Asif, M., Khan, G., Khan, H., & Saifi, S. (2025). Role of Pilates on Pregnancy and Its Related Problems. *Archives of Medicine and Health Sciences*, 13(2), 260-264.
- Aman, I., Zutshi, K., Asif, M., Khan, G., Khan, H., & Saifi, S. (2025). Role of Pilates on Pregnancy and Its Related Problems. *Archives of Medicine and Health Sciences*, 13(2), 260-264.
- Anderson, B. (2024). Pilates rehabilitation. In *Integrative Therapies in Rehabilitation* (227-238). Routledge.
- Artal, R., & O'Toole, M. (2003). Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *British journal of sports medicine*, 37(1), 6-12.
- Atkın, İ., Tamgüç, B., Kıvanç, Y., & Pehlivanoğlu, B. E. The Co-contraction Relationship Between Pelvic Floor Contraction and Transversus Abdominis: A Traditional Review. *BAU Health and Innovation*, 2(3), 125-133.
- Atkinson, L., & Teychenne, M. (2022). Psychological, social and behavioural changes during pregnancy: implications for physical activity and exercise. In *Exercise and Physical Activity During Pregnancy and Postpartum: Evidence-Based Guidelines* (21-45). Cham: Springer International Publishing.
- Bouariu, A., Panaitescu, A. M., & Nicolaides, K. H. (2022). First trimester prediction of adverse pregnancy outcomes—identifying pregnancies at risk from as early as 11–13 weeks. *Medicina*, 58(3), 332.
- Boutib, A., Chergaoui, S., Marfak, A., Hilali, A., & Youlyouz-Marfak, I. (2022). Quality of life during pregnancy from 2011 to 2021: systematic review. *International journal of women's health*, 975-1005.
- Cakmak B, Erkin G. The effect of pregnancy on the musculoskeletal system. *J Back Musculoskelet Rehabil* 2011;24:143-8.
- Cancelliero-Gaiad, K. M., Ike, D., Pantoni, C. B., Borghi-Silva, A., & Costa, D. (2014).

- Respiratory pattern of diaphragmatic breathing and pilates breathing in COPD subjects. *Brazilian journal of physical therapy*, 18, 291-299.
- Carlstedt, A., Bringman, S., Egberth, M., Emanuelsson, P., Olsson, A., Petersson, U., ... & Theodorsson, E. (2021). Management of diastasis of the rectus abdominis muscles: recommendations for Swedish national guidelines. *Scandinavian Journal of Surgery*, 110(3), 452-459.
- Chaudhry, S. R., Nahian, A., & Chaudhry, K. (2023). Anatomy, abdomen and pelvis, pelvis. In *StatPearls [Internet]*. StatPearls Publishing.
- Currie, S., Sinclair, M., Murphy, M. H., Madden, E., Dunwoody, L., & Liddle, D. (2013). Reducing the decline in physical activity during pregnancy: a systematic review of behaviour change interventions. *PloS one*, 8(6), e66385.
- Das, T., & Bandyopadhyay, N. (2023). Pilates exercises, types, and its importance: An overview. In *World Congress on Multi Disciplinary Cohesion for Positive Health and Well Being*, BS Publications (514-520).
- Daşkan, Z., Güner, Ö., & Bozkurt, T. (2019). Physical activity levels and barriers to physical activity in second and third trimester pregnant women. *Adıyaman University Health Sciences Journal*, 5(3), 1731-1745.
- Davenport, M. H. (2020). Exercise during pregnancy: a prescription for improved maternal/fetal well-being. *ACSM's Health & Fitness Journal*, 24(5), 10-17.
- de Souza Ferraz, V., Peixoto, C., Resstel, A. P. F., de Paula, Y. T. C., & de Souza Pegorare, A. B. G. (2023). Effect of the pilates method on pain and quality of life in pregnancy: A systematic review and meta-analysis. *Journal of bodywork and movement therapies*, 35, 220-227.
- Demir, C. (Ed.). (2022). Current Gynecology and Obstetrics Studies. IV. Akademisyen Kitabevi.
- Drehmer, M., Duncan, B. B., Kac, G., & Schmidt, M. I. (2013). Association of second and third trimester weight gain in pregnancy with maternal and fetal outcomes. *PloS one*, 8(1), e54704.
- Ejikeme, C., Nandakumar, V., & Gotur, D. (2025). Respiratory physiological changes in pregnancy. *Respiratory Medicine*, 246, 108245.
- Erkek, Z. Y., & Altınayak, S. Ö. (2024). The relationship between e-health literacy and healthy lifestyle behaviors in pregnant women. *Journal of Midwifery and Health Sciences*, 7(2), 282-292.

- Feria-Ramírez, C., Gonzalez-Sanz, J. D., Molina-Luque, R., & Molina-Recio, G. (2021). The effects of the pilates method on pelvic floor injuries during pregnancy and childbirth: A quasi-experimental study. *International journal of environmental research and public health*, 18(13), 6995.
- Filipec, M., & Đurin, M. J. (2025). Thermoregulation and Endocrine Response During Exercise in Pregnancy. *Physiologia*, 5(1), 2.
- Gangakhedkar, G. R., & Kulkarni, A. P. (2021). Physiological changes in pregnancy. *Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine*, 25(3), S189.
- Gao, Y., Ren, S., Zhou, H., & Xuan, R. (2020). Impact of physical activity during pregnancy on gestational hypertension. *Physical Activity and Health*, 4(1).
- Garber, C. E., Blissmer, B., Deschenes, M. R., Franklin, B. A., Lamonte, M. J., Lee, I. M., ... & Swain, D. P. (2011). American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. *Medicine and science in sports and exercise*, 43(7), 1334-1359.
- Ghandali, N. Y., Iravani, M., Habibi, A., & Cheraghian, B. (2021). The effectiveness of a Pilates exercise program during pregnancy on childbirth outcomes: a randomised controlled clinical trial. *BMC pregnancy and childbirth*, 21(1), 480.
- Güder, D. S. (2021). Determining the childbirth stories of women doing prenatal Pilates and their views on the advantages of Pilates. *Journal of Basic and Clinical Health Sciences*, 6(2), 486-494.
- Gümüşsoy, S., Öztürk, R., Kavlak, O., Hortu, İ., & Yeniel, A. Ö. (2021). Investigating pelvic floor muscle strength in women of reproductive age and factors affecting it. *Clinical Nursing Research*, 30(7), 1047-1058.
- Hendem, D. U., Koç, B. L., Karateke, A., Taymur, B. D., Yılmaz, E. Z., Aslan, F., ... & Abakay, H. (2023). Modern Analysis, Findings and Research in Obstetrics and Gynaecology. Livre de Lyon.
- Ho SS, Yu WW, Lao TT, Chow DH, Chung JW. Effects of maternity support garments on lower back pain in pregnant women: A prospective randomized controlled trial. *Physiotherapy* 2009;95:42-8.
- Hussain, A., & Bhandari, M. (2025). Psychological Changes during Pregnancy. *Journal*

of Psychiatric Nursing, 14(1).

Islam, S., Sultana, S., Islam, M. A., Ali, M. Z., & Khatun, R. (2024). Unravelling the Phenotypic, Genomic, Reproductive, Behavioral Characteristics and Management of Gayal (*Bos frontalis*) in Bangladesh: A Review. *Egyptian Journal of Veterinary Sciences*, 1-19.

Karapinar, C., & Acar, M. (2023). Pregnancy and clinical pilates. *Başkent University Faculty of Health Sciences Journal*, 9(1), 35-43.

Kersting, A., Kroker, K., Steinhard, J., Hoernig-Franz, I., Wesselmann, U., Luedorff, K., ... & Suslow, T. (2009). Psychological impact on women after second and third trimester termination of pregnancy due to fetal anomalies versus women after preterm birth—a 14-month follow up study. *Archives of women's mental health*, 12(4), 193-201.

Kim, H. B., & Hyun, A. H. (2022). Psychological and biochemical effects of an online pilates intervention in pregnant women during COVID-19: a randomized pilot study. *International journal of environmental research and public health*, 19(17), 10931.

Kömürcü, Ö., & Uğur, G. M. (2017). Pelvic floor changes resulting from childbirth. Incontinence and Neurourology Bulletin, 4, 25-34.

Krzepota, J., Sadowska, D., & Biernat, E. (2018). Relationships between physical activity and quality of life in pregnant women in the second and third trimester. *International journal of environmental research and public health*, 15(12), 2745.

Langoni, C. D. S., Resende, T. D. L., Barcellos, A. B., Cecchele, B., da Rosa, J. N., Knob, M. S., ... & Schwanke, C. H. A. (2019). The effect of group exercises on balance, mobility, and depressive symptoms in older adults with mild cognitive impairment: a randomized controlled trial. *Clinical rehabilitation*, 33(3), 439-449.

Liu, M., Tang, Q., Wang, Q., Xie, W., Fan, J., Tang, S., ... & Deng, X. (2022). Studying the sleep quality of first pregnant women in the third trimester of pregnancy and some factors related to it. *Journal of Integrative Nursing and Palliative Care*, 3(1-2022), 1-6.

Malhotra, D., Khan, A. R., Nigam, A., Khan, A., & Jaleel, G. (2025). Effectiveness of Pilates in pregnancy: A review. *Sport Sciences for Health*, 1-10.

Malhotra, D., Khan, A. R., Nigam, A., Khan, A., & Jaleel, G. (2025). Effectiveness of

- Pilates in pregnancy: A review. *Sport Sciences for Health*, 1-10.
- Mazzarino, M., Kerr, D., & Morris, M. E. (2018). Pilates program design and health benefits for pregnant women: A practitioners' survey. *Journal of bodywork and movement therapies*, 22(2), 411-417.
- Melzer, K., Schutz, Y., Boulvain, M., & Kayser, B. (2010). Physical activity and pregnancy: cardiovascular adaptations, recommendations and pregnancy outcomes. *Sports Medicine*, 40(6), 493-507.
- Mendo, H., & Jorge, M. S. G. (2021). Pilates method and pain in pregnancy: a systematic review and metanalysis. *BrJP*, 4, 276-282.
- Meneghini, V., Hauser, E., Lourenço, C. L. M., & Barbosa, A. R. (2020). Effects of exergames and resistance training on well-being in older adults: a randomized clinical trial. *Geriatrics, Gerontology and Aging*, 14(3), 152-159.
- Mens, J. M., Snijders, C. J., & Stam, H. J. (2000). Diagonal trunk muscle exercises in peripartum pelvic pain: a randomized clinical trial. *Physical therapy*, 80(12), 1164-1173.
- Meyerhoff, J., & Belew, C. (2024). Common Discomforts of Pregnancy. *Collins-Bride & Saxe's Clinical Guidelines for Advanced Practice Nursing*, 371.
- Meyerhoff, J., & Belew, C. (2024). Common Discomforts of Pregnancy. *Collins-Bride & Saxe's Clinical Guidelines for Advanced Practice Nursing*, 371.
- Nipa, S. I., Sriboonreung, T., Paungmali, A., & Phongnarisorn, C. (2022). The effects of pelvic floor muscle exercise combined with core stability exercise on women with stress urinary incontinence following the treatment of nonspecific chronic low back pain. *Advances in urology*, 2022(1), 2051374.
- Okeahialam, N. A., Oldfield, M., Stewart, E., Bonfield, C., & Carboni, C. (2022). Pelvic floor muscle training: a practical guide. *bmj*, 378.
- Osar, E., & Bussard, M. (2016). *Functional Anatomy of the Pilates Core: An Illustrated Guide to a Safe and Effective Core Training Program*. North Atlantic Books.
- Örnek, C., Sarıyıldız, A., & Coşkun Benlidayı, İ. (2023). Exercise During Pregnancy with Frequently Asked Questions. *Journal of Physical Medicine & Rehabilitation Sciences*, 26(3).
- Parker, E. A., Meyer, A. M., Goetz, J. E., Willey, M. C., & Westermann, R. W. (2022). Do relaxin levels impact hip injury incidence in women? A scoping review. *Frontiers*

in *endocrinology*, 13, 827512.

- Pedriali, F. R., Gomes, C. S., Soares, L., Urbano, M. R., Moreira, E. C. H., Averbek, M. A., & de Almeida, S. H. M. (2016). Is pilates as effective as conventional pelvic floor muscle exercises in the conservative treatment of post-prostatectomy urinary incontinence? A randomised controlled trial. *Neurourology and urodynamics*, 35(5), 615-621.
- Pelz, B., Thomas, C., & Cleary, T. (2025). Genetics, Prenatal Development, and Birth. *Lifespan Development*.
- Petrenko, A. P., Castelo-Branco, C., Marshalov, D. V., Kuligin, A. V., Mysovskaya, Y. S., Shifman, E. M., & Abdulaev, A. M. R. (2021). Physiology of intra-abdominal volume during pregnancy. *Journal of Obstetrics and Gynaecology*, 41(7), 1016-1022.
- Rayes, A. B. R., de Lira, C. A. B., Viana, R. B., Benedito-Silva, A. A., Vancini, R. L., Mascarin, N., & Andrade, M. S. (2019). The effects of Pilates vs. aerobic training on cardiorespiratory fitness, isokinetic muscular strength, body composition, and functional tasks outcomes for individuals who are overweight/obese: a clinical trial. *PeerJ*, 7, e6022.
- Ribeiro, M. M., Andrade, A., & Nunes, I. (2022). Physical exercise in pregnancy: benefits, risks and prescription. *Journal of perinatal medicine*, 50(1), 4-17.
- Salles, G. F., Schlüssel, M. M., Farias, D. R., Franco-Sena, A. B., Rebelo, F., Lacerda, E. M., & Kac, G. (2015). Blood pressure in healthy pregnancy and factors associated with no mid-trimester blood pressure drop: a prospective cohort study. *American journal of hypertension*, 28(5), 680-689.
- Salvesen, K. Å., & Mørkved, S. (2004). Randomised controlled trial of pelvic floor muscle training during pregnancy. *Bmj*, 329(7462), 378-380.
- Sancar, Ş., Güzel, N. A., Çobanoğlu, G., Özdemir, Y., & Bayram, M. (2021). The Changes in Balance During Pregnancy: A Prospective Longitudinal Study. *Clinical and Experimental Health Sciences*, 11(1), 127-132.
- Sarmiento, L. A., Pinto, J. S., da Silva, A. P., Cabral, C. M., & Chiavegato, L. D. (2017). Effect of conventional physical therapy and Pilates in functionality, respiratory muscle strength and ability to exercise in hospitalized chronic renal patients: a randomized controlled trial. *Clinical rehabilitation*, 31(4), 508-520.
- Sexton, J., Andrews, C., Carruthers, S., Kumar, S., Flenady, V., & Lieske, S. (2021).

- Systematic review of ambient temperature exposure during pregnancy and stillbirth: methods and evidence. *Environmental research*, 197, 111037.
- Souza, C., Krüger, R. L., Schmit, E. F. D., Wagner Neto, E. S., Reischak-Oliveira, Á., de Sá, C. K. C., & Loss, J. F. (2021). Cardiorespiratory adaptation to Pilates training. *Research Quarterly for Exercise and Sport*, 92(3), 453-459.
- Subhan, F. B. (2013). *Gestational Weight Gain and Body Composition Changes during Pregnancy and Early Postpartum*. University of Alberta (Canada).
- Szumilewicz, A., Dornowski, M., Piernicka, M., Worska, A., Kuchta, A., Kortas, J., ... & Jastrzębski, Z. (2019). High-low impact exercise program including pelvic floor muscle exercises improves pelvic floor muscle function in healthy pregnant women—a randomized control trial. *Frontiers in physiology*, 9, 1867.
- Theodorsen, N. M., Bø, K., Fersum, K. V., Haukenes, I., & Moe-Nilssen, R. (2024). Pregnant women may exercise both abdominal and pelvic floor muscles during pregnancy without increasing the diastasis recti abdominis: a randomised trial. *Journal of Physiotherapy*, 70(2), 142-148.
- Ünver, H., & Aylaz, R. (2017). Effect of physical exercise on quality of life in pregnant women.. *Journal of Clinical Obstetrics & Gynecology*, 27(2), 71-78.
- Walsh, S. J., Ashcroft, S. K., Starc, L. C., Thompson-Butel, A. G., Spathis, J. G., & Beetham, K. S. (2025). Lumbo–pelvic–hip complex strengthening with and without isolated pelvic floor muscle training for postpartum pelvic floor health: a systematic review and meta-analysis. *Journal of Science and Medicine in Sport*.
- Walsh, S. J., Ashcroft, S. K., Starc, L. C., Thompson-Butel, A. G., Spathis, J. G., & Beetham, K. S. (2025). Lumbo–pelvic–hip complex strengthening with and without isolated pelvic floor muscle training for postpartum pelvic floor health: a systematic review and meta-analysis. *Journal of Science and Medicine in Sport*.
- Wells, C., Kolt, G. S., & Bialocerkowski, A. (2012). Defining Pilates exercise: a systematic review. *Complementary therapies in medicine*, 20(4), 253-262.
- Wu, H., Sun, W., Chen, H., Wu, Y., Ding, W., Liang, S., ... & Ming, W. K. (2021). Health-related quality of life in different trimesters during pregnancy. *Health and Quality of Life Outcomes*, 19(1), 182.
- Yang, X., Li, H., Zhao, Q., Han, R., Xiang, Z., & Gao, L. (2022). Clinical practice guidelines that address physical activity and exercise during pregnancy: a systematic review. *Journal of midwifery & women's health*, 67(1), 53-68.

Yimer, A., Endris, S., Wossen, A., & Abate, M. (2024). Pregnant women's knowledge, attitude, and practice toward physical exercise during pregnancy and its associated factors at Dessie town health institutions, Ethiopia. *AJOG Global Reports*, 4(4), 100391.

About The Authors

Yeşim ANIK ÇANKAYA, Asist. Prof. at Karamanoğlu Mehmet Bey University in Karaman, Türkiye. She serves as a faculty member in the Department of Nursing, Faculty of Health Sciences, and Department of Obstetrics and Gynecology at Karamanoğlu Mehmetbey University. Her primary areas of interest are women's health and fear of childbirth, as well as validity and reliability studies.

E-mail: yesimanik@windowslive.com, **ORCID :** 0000-0003-4832-3362

Musa ÇANKAYA, PhD, is Lecturer Doctor at Necmettin Erbakan University in Konya, Türkiye. He holds a PhD in physiotherapy and rehabilitation from Necmettin Erbakan University. Her main areas of interest are orthopedic rehabilitation, electrophysical agents, validity and reliability studies.

E-mail: mcankaya@erbakan.edu.tr, **ORCID:** 0000-0002-2093-5036

Similarity Index:

The similarity index obtained from the plagiarism software for this book chapter is 8%.