

## Pilates for Pregnant Women: A Healthy Alternative

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### Abstract

Pregnancy is a specific stage in women's life, a time when they face physiological and biomechanical changes that, without proper monitoring, lead to the emergence of musculoskeletal discomforts. Most of these issues are associated with postural changes, balance, ligament laxity, body weight increase and cardiorespiratory disorders. The Pilates method provides several benefits such as increased respiratory capacity, improved muscle strength and the strengthening of torso-stabilizing muscles, flexibility, spine mobility, postural alignment, coordination, proprioception, balance and motor control. Given the specific condition of pregnant women and the variations derived from such condition, Pilates may positively contribute to these women's health within their physical and psychological limitations. The aim of the current study is to address the importance of Pilates, clinical guidelines and physical activities practiced in the main pregnancy periods (trimesters) through a bibliographical analysis. Pregnant women are known for the several physiological changes they go through; thus, Pilates can make important contributions to their health, such as the promotion of quality of life and wellbeing to improve their adaptation to each gestational week.

**Keywords:** Pregnancy; Pregnant women; Parturient; Pelvic floor; Perineum; Muscles; Movement; Physical exertion; Locomotor activity; Pilates

### Introduction

As pregnancy evolves, women's physical capacity reduces. Therefore, exercising during pregnancy should be prioritized and encouraged [1,2].

According to the World Health Organization (WHO), 31% of the world population at the age of 15 years or older show insufficient physical activity level. This prevalence is even higher among pregnant women [1].

Choosing an adaptable and interesting physical activity increases the satisfaction and attendance degree and, consequently, decreases sedentariness. According to Tavares et al. the sedentary lifestyle affected 100% of the pregnant women participating in a study carried out with 118 pregnant, sedentary women in the 32<sup>nd</sup> gestational week [3].

Healthy pregnant women, who prioritize their well-being, during and after pregnancy, acknowledge the importance of this moment of great transformation in their bodies and seek to improve and keep their conditioning, strength and physical fitness. The main goal of Pilates lies on body strengthening and stabilization, pain relief, as well as on improved flexibility, concentration and breathing [4].

Nowadays, Pilates has been used as a physical or therapeutic activity technique, which applies well-oriented and optimized movements to generate physical and mental wellbeing [5,6].

The Pilates' philosophy and strategy may be applied to pregnant women because they strengthen the muscles responsible for lumbopelvic stabilization, improving postural alignment and respiratory pattern, and optimizing daily-living activity movements.

Pregnancy is associated with several musculoskeletal and hormonal changes; thus, it is crucial orienting all pregnant women to avoid compensations, as well as to make them more aware of their bodies [3].

The Pilates method uses the resistance of the springs assembled in the equipment to quantify the exercises. Therefore, it is worth performing a force/time assessment, since force and time are important elements to be taken into consideration at the time to prescribe the exercises. The principles of Pilates, such as breathing, must be emphasized; after all, individuals who breath well can benefit from aspects such as maximum exercise attainment, concentration (which allows coordinating the thoughts and the energy to a certain body area) and centralization (which is essential to develop the muscles responsible for supporting the body, as well as to strengthen the torso-transverse abdomen, multifidus muscle, pelvic floor and latissimus dorsi). Stability-challenging exercises are introduced to the exercise program when these muscles are well developed. Therefore, the aim of Pilates exercises applied to pregnant women is to improve the physical, physiological and mental conditions of these women in order to assure both the mother and the baby's health [3,6].

During pregnancy, the female body goes through moments when all systems are provisionally involved. Thus, the Pilates method, which was first developed under the name "Contrology" by Joseph Pilates, has the overall philosophy of achieving and coordinating all systems-mind, spirit and body by taking into consideration the entire physiological process. Therefore, Pilates allows women to rapidly recover their silhouette after giving birth through abdominal and muscle strengthening exercises. One of the great causes of low self-esteem is the diastasis recti i.e., the rectus abdominis muscle separation, since it affects two-thirds of pregnant women [6,7].

The aim of the current study is to address the Pilates method efficacy and benefits during pregnancy [3].

## Pilates' Special Conditions during Pregnancy

It is possible avoiding painful manifestations during pregnancy through the practice of physical exercises. Lumbar pain is common during this period and several factors must be taken into account; among them, the sedentary lifestyle, as well as the existence of previous pain and emotional factors, stand out. The pain may worsen due to increased muscle weakness, poor flexibility, poor joint mobility, poor posture and due to the compensations pregnant women experience during the gestational weeks [8,9].

Nowadays, pregnant women are concerned about keeping a good body weight so as not to develop pathologies such as Hypertension and Gestational Diabetes Mellitus. The Pilates method is one of the techniques extensively used by physical therapists, since it provides physical conditioning, as well as body control and awareness. In addition, it does not impose undue stress on the human body [8,10,11]. Good guidance enables pregnant women to maintain an adequate posture and reduce compensations in the lower back. Thus, it is possible reducing the pain episodes and, consequently, improving the quality of life of pregnant women, mainly in their daily-life activities [12,13].

Several hormonal, hemodynamic and biomechanical changes take place throughout the gestational trimesters, mainly in the second and third ones. The growth of the gravid uterus, and of body structures, results in increased pressure over the pelvic floor muscles, as well as in edema, weight gain, ligament laxity and postural changes [14].

The increased blood volume, heart rate and cardiac output, both at rest and during exercise, stand out among the changes taking place in the pregnant women's body during the first two trimesters.

There is increased compression in the inferior vena cava from the third gestational trimester on, and it may lead to arterial hypotension. Hormonal changes such as increased estrogen, progesterone and relaxin reduce the muscle tone, which is responsible for stabilizing the joints. The ligaments also undergo relaxation, mainly in the pelvic region. All these changes make it necessary adapting pregnant women's physical exercises in order to facilitate their movements. According to Balogh, the Pilates method has beneficial effects on pregnant women, since it allows increasing the thoracic cavity through respiratory exercises, as well as strengthening the abdominal muscles and improving urinary incontinence [15-21].

Women's quality of life should be one of the main goals of physical activity, which should address weight management, pains (mainly the postural-related ones), postpartum-depression risk reduction, and greater autonomy in labor. "It is essential assessing health-related quality of life in order to identify different wellbeing and health economics levels by investigating the efficacy, effectiveness, efficiency and usefulness of different therapies available for several types of diseases or conditions" [22].

The Pilates method is an exercise modality that can be therapeutically used to provide physical conditioning, since it exercises the body as a whole and is based on Contrology, i.e., the conscious control of body and joint movements. Studies have found that activities such as Pilates help rebalancing body muscles, as well as improving body awareness, breathing and wellbeing [14]. The principles in this method should focus on improving the efficacy of the exercises to be practiced during class through breathing, body alignment, torso control, as well as movement efficiency and fluency [7].

Another point of fundamental importance concerns the fact that pregnant women practicing Pilates should work in partnership with their physiotherapists in order to improve their training, as well as to be well informed about and more involved with the treatment, thus generating better conditions and resources for an integrated and collaborative treatment. Consequently, the individualized treatment becomes more effective. In addition, the role played by pregnant women is very important from the moment they describe their goals to the feedback they provide during and in the end of the treatment, since it allows them to be informed about the most favorable results, as well as to avoid risks, thus showing greater adherence to the practice of Pilates [23,24].

## First Trimester

The physical activity should be performed in a mild-to-moderate degree, even by sedentary pregnant women [2].

The muscle stretching is relevant to Pilates practice because it reduces the pain in the lower back and pelvic regions. It is known that 50% of the pregnant women present symptoms such as back, lower back and pelvic pain. Martin and Silva have found that pregnant women subjected to stretching presented reduced or no lower back discomfort [16-18].

Stretching exercises should be performed in the first pregnancy trimester in order to enable muscle strength gain, mainly in large muscle groups (gluteal, external rotators, transverse abdominal, paravertebral, latissimus dorsi and shoulder girdle muscles), as well as to train the pelvic floor [2].

Barakat et al. have assessed 160 pregnant women. 80 of them performed light muscle resistance training three times a week, and found that women who practiced exercises showed lower gestational weight gain [19].

According to the study by Sihvonen et al. 32 pregnant women have shown direct correlation between pain and activation level in the paraspinal muscles of the lumbar spine during the first pregnancy trimester [16].

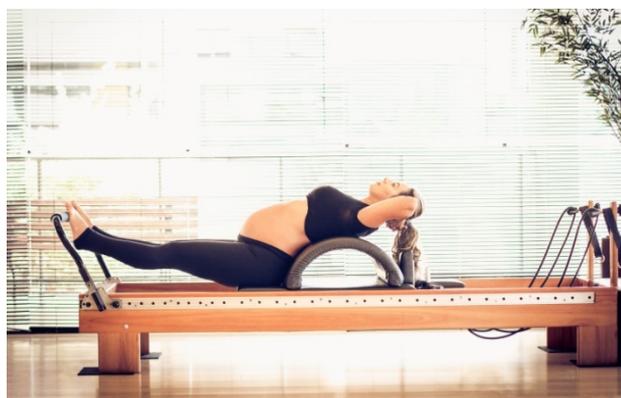
It is essential performing low-weight exercises, improving body awareness and spine mobility, as well as avoiding eccentric abdominal exercises during this pregnancy period (Figures 1-3) [7].



**Figure 1:** Mermaid on the reformer, stretching and relaxation of the lateral torso muscles; emphasis on the organization of head, neck and shoulders.



**Figure 2:** Seated push through, spine alignment and paravertebral muscles strengthening.



**Figure 3:** Spine extension on the reformer using flymoon.

## Second Trimester

Pregnant women begin to better perceive pregnancy-related changes such as weight gain, as well as bigger breasts and abdomen, during this period. It is worth emphasizing the individuality aspect, since these changes are different from one woman to another [20].

Greater attention should be paid to avoid holding supine positions for a long period from the 20<sup>th</sup> gestational week on recommendations for physical exercise during pregnancy[2].

The relaxin hormone is released around the 12<sup>th</sup> gestational week, and it results in joint looseness. Thus, it is necessary being careful at the time to perform stretching exercises, because they may increase the risk of injuries [2].

The enlargement of the pubic symphysis and the exercises may result in pain and stress to this musculature. The relaxin is also responsible for remodeling connective tissues. In addition, it decreases the tensile forces and increases the pressure on the pelvic floor [2,4,5].

The second trimester comes along with possible compensations in the lumbar region during the practice of exercises, thus increasing the lumbar lordosis.

Since, the relaxin hormone level also increases during this period, excessive or forced stretching exercises should be avoided, whereas strengthening exercises should be prioritized.

In addition, exercise adaptations should be done due to changes in the gestational biomechanics. It is worth emphasizing the importance of strengthening the rhomboid, paravertebral, internal and external hip rotator and transverse abdominal muscles, as well as of performing pelvic floor exercises (Figures 4-6) [7].



**Figure 4:** Seated mermaid-torso stretching and mobilization through lateral flexion.



**Figure 5:** Horse-strengthening of the pelvic floor, adductor and torso stabilizer muscles.



**Figure 6:** Scooter-stretching of the posterior chain muscles, strengthening of quadriceps and gluteal muscles.

### Third Trimester

As the weight gain and the limitations increase, the exercise pace and intensity decrease. The pelvic floor muscles should be continuously trained in order to provide greater awareness about relaxation and flexibility increase [2]. Caromano has analyzed the respiratory pressures in 150 pregnant women divided into first, second and third gestational trimesters and found that the chest mobility and the respiratory pressures decrease in the first trimester and increase throughout pregnancy (Figures 7-9) [23].



**Figure 7:** Seated pull down-strengthening of biceps, latissimus dorsi and elbow flexor muscles.

The load in the upper and lower limb exercises, as well as in the pelvic mobilization ones, should be increased in the final gestational stage in order to prepare pregnant women for the postpartum period, when they will take care of their babies. Abdominal contraction associated with pelvic floor contraction is not used if the pregnant woman makes the option for vaginal delivery, because, at the time to

deliver the baby, she must perform abdominal contraction and relax the pelvic floor musculature. It is essential continuously monitoring the clinical signs of pregnant women during the practice of exercises at the end of the third trimester, since there may be fluid or blood loss [7].



**Figure 8:** Seated footwork-helps strengthening the legs, as well as controlling the core and the torso stabilizers.



**Figure 9:** Bridging with extended legs-favors the venous return and helps providing space for the baby to change position.

### Conclusion

The knowledge about the physiological and psychological changes affecting pregnant women, in association with the training in Pilate's techniques, may promote and contribute to a gestational period with no complications and to reduce the risk of low-back pain and osteoarticular discomforts. Stabilization, strengthening and stretching exercises should be performed, but the gestational week and the

patient's physical and emotional limitations must be respected. It is possible seeing that the physical activity is beneficial to pregnant women. Thus, such practice should be encouraged by health professionals.

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