

Changes in Skeletal System during Pregnancy



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Introduction

Pain localized at the pelvic girdle during and after pregnancy has been keyed out and registered as an entity since the 4th century BC by Hippocrates. Contemporary medical research since the early 20th century has attempted to clarify the spectrum of the different pathologies that this clinical syndrome represents [1]. Up till now, the pregnancy causes changes in spinal curvature and posture remains open for further studies. One of the most frequent complications of pregnancy is low back pain, with 50±70% prevalence [2]. Its incidence is higher in the third trimester of pregnancy, when the most important biomechanical and morphological changes take place. From the second trimester, abdominal morphology is altered by the increased size of the uterus and the weightiness of the fetus, with a 30% gain in abdominal mass [3]. Despite the frequent occurrence of the problem, no explicit criteria for diagnosis and therapy guidelines are available in the literature. The increased size of the abdomen has been linked to a decreased static stability and adaptive changes in spinal curvatures, which would compensate the anterior displacement of the center of gravity, to ensure postural balance [4].

Postural alterations most frequently mentioned in the literature are increased lumbar curvature, pelvic ante version as illustrated in Figures 1 & 2; [5] increased thoracic curvature [6], increased cervical curvature, protraction of the shoulder girdle, hyper extended knees [7], and extension of the ankles [8] Walking is an essential daily activity and important in controlling adipose tissue weight gain associated with pregnancy [9,10]. The mechanics of walking, however may be affected as pregnancy, are characterized by maternal changes in shape and dimensions, particularly in the trunk. As pregnancy progresses, the lower trunk segment inertial characteristics show a significantly larger rate of increase than any other body segments. With rapid changes in mass, and moment of inertia, [11] trunk segment kinematics may be altered in daily activities such as walking. The possibility of altered kinematics is important as this may also affect the kinetics and hence musculoskeletal demands on the trunk segments [12]. Much of the

focus on trunk mechanical adaptations in pregnancy has been on static postures [13]. These adaptive changes include:

- I. Postural changes include forward head, rounded shoulders increased head, rounded shoulders, increased lumbar lordosis, hyper extended knees and pronated feet.
- II. The core of gravity shifts forward, resulting in some balance disturbance.
- III. Powerful changes are also distinctive and include shortened hip flexors, lower back musculature, and pectorals. Abdominal muscles, neck, and upper back muscle groups elongate. This may promote stretch weakness.
- IV. Bones and joints: There is a tendency to decalcification of bones, subluxation of joints due to softening of ligaments by relaxing hormone. It is more marked in sacroiliac joint and symphysis pubis, which allows stretching at the time of delivery of the baby.
- V. It is due to the growth in size of the uterus and pressure along the abdominal wall. The patient walks with head and shoulders thrust back and chest protruding outward to cover. This affords the patient a "waddling" gait.

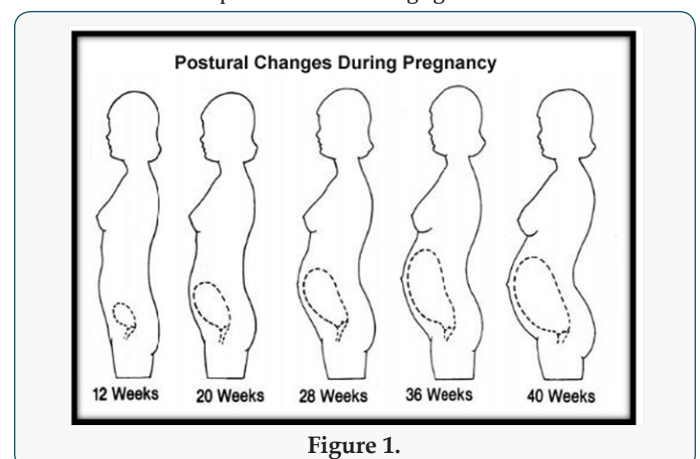


Figure 1.

VI. Foti and associates reported an increased peak anterior pelvic tilt in late pregnancy when compared to one year post-birth with no differences in pelvic rotation in the transverse or coronal plane. No control group was used and differences may have been referable to natural human variability with retesting [14] (Figure 1 & 2).

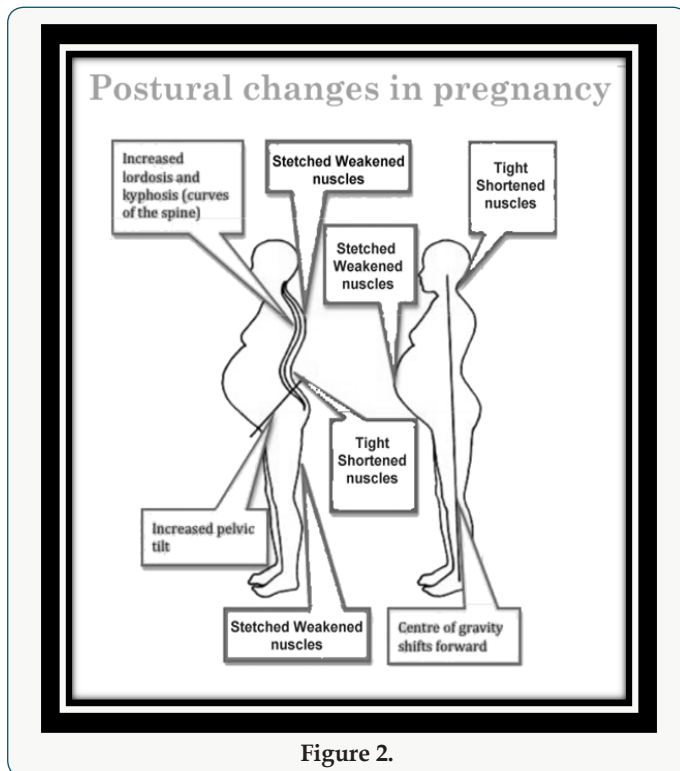


Figure 2.

Gait in pregnant women often comes out as a "waddle"—a forward gait that includes a lateral portion. Yet, research has shown that the forward gait alone remains unchanged during pregnancy. It has been set up that gait parameters such as gait kinematics, (velocity, step length, and cadence) remain unaltered during the third trimester of pregnancy and 1 year after delivery. These parameters indicate that there is no change in forward motion. There is, though, a significant gain in kinetic gait parameters, which may be employed to explain how gait motion remains relatively unchanged despite increases in body mass, width and changes in mass distribution near the waist during pregnancy. These kinetic gait parameters suggest an increased role of hip abductor, hip extensor, and ankle plantar flexor muscle groups. To pay for these gait deviations, pregnant women often makes adaptations that can result in musculoskeletal injuries. While the estimate of "waddling" cannot be distributed, these outcomes indicate that exercise and conditioning may help alleviate these injuries [14]. The foot is the most distal structure in the human body, it is in close contact with the ground, and is an integral component of the gait. The foot of a pregnant woman undergoes many changes as pregnancy advances. These modifications could be ascribed to the anatomical and physiological alterations that involve the musculoskeletal system. Understanding the structural changes of the foot during pregnancy

and postpartum is important because any changes in the structure may alter the entire foot biomechanics, which can in turn vary the force propagation from the foot through the lower-limb joints of the spine. The foot of a pregnant woman undergoes morphological changes with the progress of pregnancy. It is significant to realize the morphological alterations of the foot during pregnancy and postpartum because any such change may alter the plantar pressure pattern and the entire foot biomechanics. The feet of pregnant women tend to get promoted as pregnancy advances, but do not reach baseline values even at 6 weeks postpartum. Pregnant women tend to bear more weight on the dominant foot with an increased static hind foot pressure as pregnancy progresses.

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