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**DEPARTMENT: NURSING SCIENCE**

**COLLEGE: MEDICINE AND HEALTH SCIENCES**

**ASSIGNMENT TITLE: PREGNANCY**

**COURSE TITLE: PHYSIOLOGY**

**COURSE CODE: PHS 212**

**QUESTION:** Elucidate the physiological adaptations of the female to pregnancy.

**ANSWER:**

In pregnancy, a number of anatomical, physiological, biochemical and psychological changes takes place. These changes may also unmask or worsen a preexisting condition or disease, ultimately because the pregnant woman’s body cannot adequately adapt to the changes of pregnancy.

Some of the physiological changes that take place are;

* Skin changes
* Changes in the gastrointestinal system
* Cardiovascular changes [blood volume, cardiac output, heart rate, cardio circulatory changes during labor and delivery.]
* Physiological respiratory changes
* Renal physiological changes
* Changes in the reproductive system
* Muscular skeletal and neurologic symptoms

**SKIN CHANGES**

A number of changes take place in the skin of pregnant women. Mechanical stretching of the skin over the abdomen and the breasts can lead to **STRIAE.** The increased levels of estrogen and progesterone have also been implicated. Usually striae remain permanently with some change in color.

Vascular spider nevi and palmar erythema happen also during pregnancy. There is no clear explanation for these changes, but they most likely represent the result of vasodilatation that happens in the skin during pregnancy. Chloasma and other pigmented lesions can happen as a result of increased melanocytes. These lesions usually begin at about five to six months gestation. One way these lesions may be prevented is by the use of screening agents and avoidance of direct sunlight.

**CHANGES IN THE GASTROINTESTINAL SYSTEM**

Nausea and vomiting are the most frequent complaints involving the gastrointestinal system and usually happens in early pregnancy while heart burn happens primarily in late pregnancy. The gum becomes hyperemic and edematous during pregnancy and tends to bleed. The muscular wall of the esophagus is relaxed and this may cause reflux, which in turn can lead to esophagitis and heartburn. Decreased motility of the large intestine may lead to constipation.

The liver is affected significantly by pregnancy. Cholestatic jaundice is considered to be the result of estrogen effect on elimination of bilirubin by the liver.

Pregnancy also increases the size and decreases the motility of the gall bladder. The decreasing motility and increase in volume, combined with changes in the bile’s composition, explain the correlation between the incidence of cholelithiasis and pregnancy.

**CARDIOVASCULAR CHANGES**

* BLOOD VOLUME

 Significant increase in the blood volume starts taking place in the first trimester and continues until the mid-third trimester, at approximately the 32nd to the 34th week. Beyond this point in gestation, the blood volume plateaus.

 The average absolute increase in blood volume during pregnancy is about 1600 ml and in terms of percent change one should a 40 to 50 percent increase above pre-pregnancy levels. The increase in the blood volume is achieved by a combination of increases in the plasma volume and the RBC mass. The calculated plasma volume expansion is approximately 1300 ml and the volume of the RBC increases about 400 ml. This discordance in the change between the cellular elements of the blood and the liquid portion leads to the so called “physiologic anemia of pregnancy”.

* CARDIAC OUTPUT

 The cardiac output increases an average of 50 percent during pregnancy. It is generally accepted that cardiac output begins to rise during the first trimester, probably around the 10th week of pregnancy and continues to rise up until the 24th week of gestation. Once it reaches the peak it stays rather stable.

Cardiac output is a product is a product of stroke volume and pulse rate. The rise in cardiac output early in pregnancy is disproportionately greater than the increase in heart rate, and therefore is attributable to argumentation in stroke volume. As pregnancy advances, heart rate increases and becomes a more predominant factor in increasing cardiac output. As the late stages of pregnancy, the stroke volume declines to normal, non-pregnant values.

* HEART RATE DURING NORMAL PREGNANCY

 The baseline heart rate increases by about 10 to 20 beats per minute. This increase starts early in pregnancy and gradually continues to go upward with the highest values achieved at term. The total increase happens early in pregnancy and remains so throughout the remainder of gestation.

In twin gestations, the rise of the heart rate is more pronounced and it can reach as much as 40 percent above the non-pregnant state. A change also from the supine position to the lateral position may cause the heart rate to drop slightly.

* CARDIOCIRCULATORY CHANGES DURING LABOR AND DELIVERY

 During labor significant hemodynamic changes take place. These changes can in part be explained by the effect of the uterine contractions, which may cause a significant increase of 300 to 500 ml in central blood volume and in part by the effect of plain and anxiety on the cardiovascular system. It is important to note here that in the lateral position, cardiac output between contractions is higher than in supine position and the increase during contractions is smaller.

**PHYSIOLOGICAL RESPIRATORY CHANGES**

* ANATOMIC CHANGES

 Mucosal edema and hyperemia secondary to capillary engorgement are common findings in the nasopharynx and the tracheal bronchial tract. In fact the majority of pregnant women have redness and swelling of the lungs that at times can produce changes in the voice. Changes also occur in chest circumference (6 to 7 cm), vertical diameter (4 to 5 cm), and the substernal angle (from 70 to 105 degrees). The increase in the chest circumference compensates for the elevation of the diaphragm, so that essentially there is no change in the overall volume of the thoracic cavity.

**RENAL PHYSIOLOGICAL CHANGES**

* ANATOMIC CHANGES

 The kidney size increase only slightly during normal pregnancy. However, the more striking in structural changes are those of the ureters, calyces and renal pelvis. These changes are readily seen as early as the third month of gestation and remain until approximately the fourth month postpartum. Since these changes appear long before the gravid uterus is large enough to cause mechanical compression of the ureters, a hormonal effect is postulated.

**CHANGES IN THE REPRODUCTIVE SYSTEM**

Rhythmic tightening of the uterus occurs as part of preparatory changes for labor. These are called Braxton- Hicks contractions and since the advent of ultrasound, can be seen as early as eight to nine weeks. As the pregnancy advances these contractions become more frequent and they are more likely to be felt by the patient. Usually they happen every 5 to 20 minutes and sometimes they may last as long as 30 minutes.

The genital orangs undergo significant changes with increased vascularity of the cervix and increased mucous formation by the cervical glands due to increased levels of estrogen. The vulva and the vagina are also edematous and present increased desquamation and transudation. This leads to an increase in the secretions of the vagina manifesting as increased leucorrhea. The secretions of the vagina are acidic because of the conversion of an increased amount of glycogen in the vaginal epithelial cells by Doderlein’s Bacilli into lactic acid.

**MUSCULAR SKELETAL AND NEUROLOGIC SYMPTOMS**

A number of women may experience backache in the upper back, which is secondary to muscle tension from increasing breast size and discomfort. Most women however experience low back pain secondary to muscular fatigue and strain that is caused by the changes in body balance from the growing uterus.several patients also may experience pressure on nerve roots that in turn may lead to muscular spasms and pelvic joined pains secondary to bone ligament relaxation from the sex hormones. The change that happen on the ligament and the cartilage of the pelvic bones secondary to the sex hormones may also lead some women to present with gait alteration.