International Refereed Journal of Engineering and Science (IRJES)
ISSN (Online) 2319-183X, (Print) 2319-1821
Volume 14, Issue 3 (May - June 2025), PP. 28-30

Physiological Adaptations During Pregnancy: A Systemic Overview

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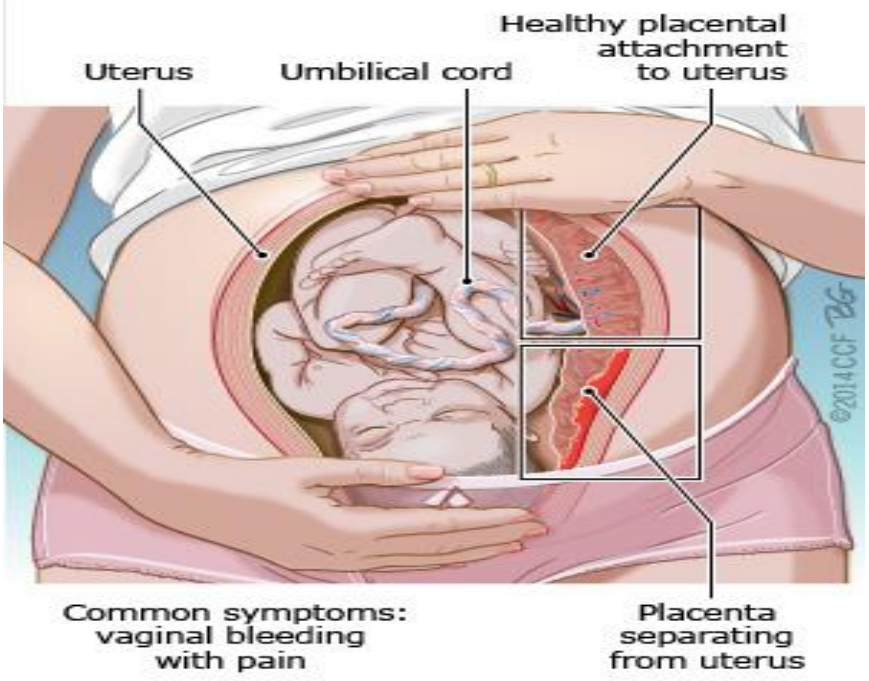
Date of Submission: 12-05-2025 Date of acceptance: 27-05-2025

Pregnancy is a dynamic physiological state that brings about extensive systemic changes in a woman's body to support the developing fetus and prepare for childbirth. These adaptations occur across multiple organ systems, including cardiovascular, respiratory, renal, gastrointestinal, endocrine, hematologic, musculoskeletal, and integumentary systems. Key changes include increased blood volume and cardiac output, elevated hormone levels, insulin resistance, and modifications in respiratory function. While most of these alterations are normal and essential, they can sometimes mimic or mask pathological conditions, posing diagnostic challenges. Understanding these physiological changes is crucial for healthcare providers to distinguish between normal adaptations and clinical complications, thereby ensuring optimal prenatal care and maternal well-being. This paper aims to provide a comprehensive overview of the physiological changes during pregnancy, highlighting their clinical significance and implications for maternal and fetal health.

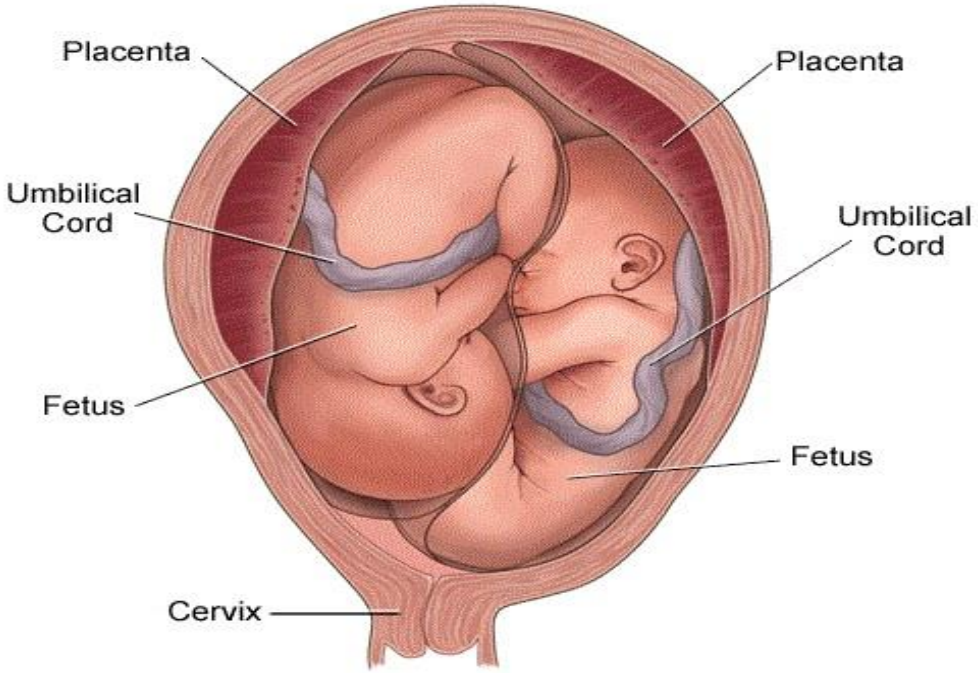
Total Plasma volume in a non pregnant woman averages 2600ml. By 34weeks it is about 50% greater than it was at conception. If the plasma volume does not increase up to the standard volume, there is risk for still birth ,abortion and low birth weight babies. The expansion of blood volume is required to allow the circulation of blood through the placenta and allow it carry nutrients and oxygen to the fetus and metabolic wastes away from the fetus .Blood volume expands by 50% resulting in a decreasing hemoglobin levels, blood glucose values and serum levels of albumin, other serum proteins and water soluble vitamins. The decline in serum albumin levels contributes to a tendency for extra cellular water to accumulate during pregnancy.



The decrease in water soluble vitamins concentration makes determination of a inadequate intake or a deficient nutrient state difficult. By contrast, serum concentration of fat soluble vitamins and other liquid fractions such as triglycerides ,cholesterol and free fatty acids increase.

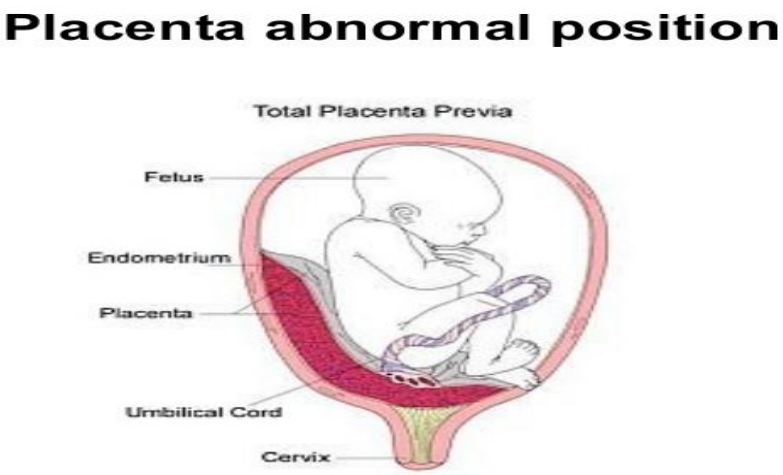
• There is a decreased ability to taste saltiness. This may infact be a physiologic mechanism for increasing salt intake.

• Increased progesterone level relaxes the uterine muscle to allow expansion with fetal growth. Gastrointestinal motility diminishes ,to allow for increased absorption of nutrients. This often results in constipation. Additionally a relaxed lower esophageal sphincter can cause regurgitation and heartburns.



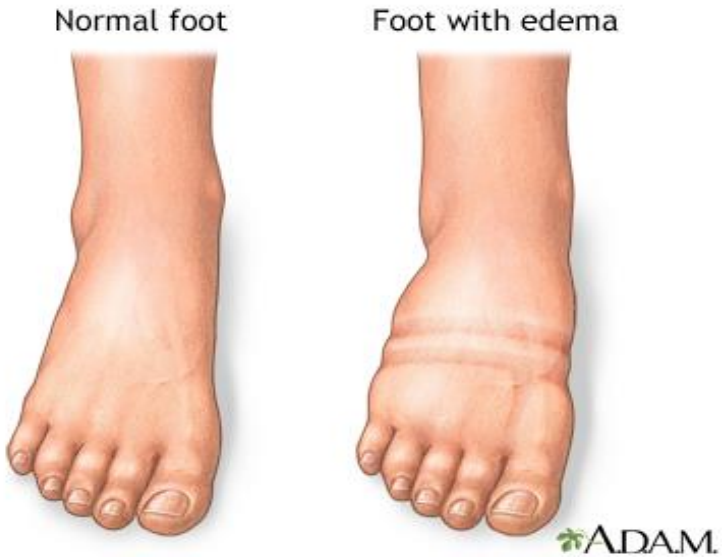
• Increased amount of amino acids ,glucose and water-soluble vitamins may appear in the urine. This may be a reason for the increased number of urinary tract infection seen in pregnant woman.

• The ability to excrete water is lowered and oedema in the legs and ankles is common and normal. Less than half of the total weight gain resides in the fetus, placenta and amniotic fluid :the reminder is found in maternally reproductive tissues ,fluid ,blood and maternal stores a component composed largely of body fat.



• Gradually increasing subcutaneous fat in the abdomen, back and upper thigh serves as an energy reserve pregnancy and lactation.

• Increased weight gain during pregnancy is associated with increased birth weight and a progressive decrease in the number of LBW infants.



ROLE OF PLACENTA:

• The Placenta is the principal site of production for several harmones responsible for regulation of fetal growth and development of maternal support tissues. It is also involved for exchange of nutrients, oxygen and waste products . Any derange to or inadequacy in the placenta compromises its ability to nourish the fetus, regardless of how well nourished the mother is or how optimal her dietary intake.