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Proteinews

(COVID Special Edition 4)

Pregnancy and Infections... The double-threat

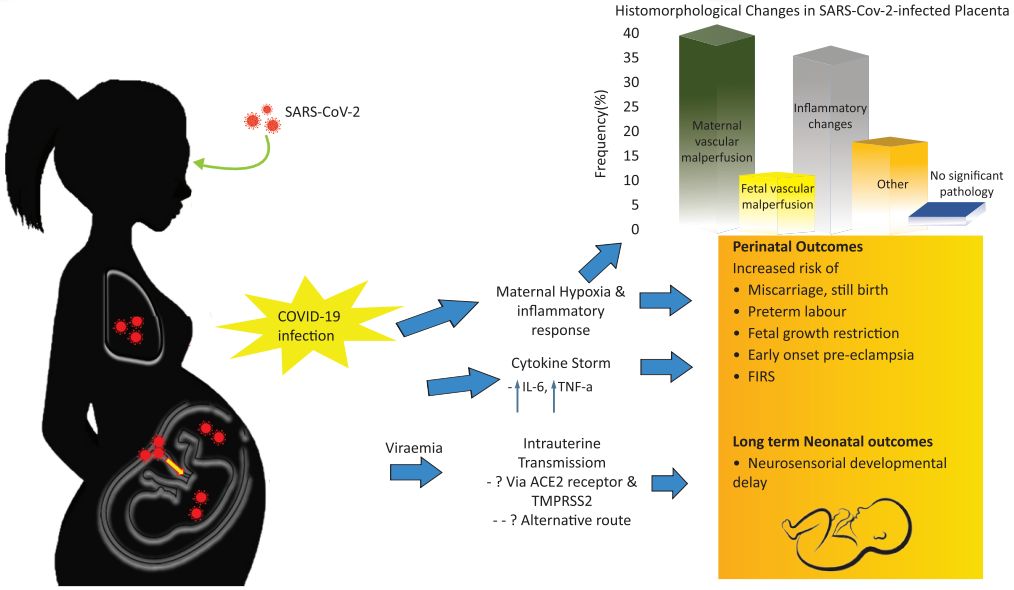
In the early weeks of pregnancy, the levels of progesterone and estrogen are increased[1].

These hormonal fluctuations lead to a weakening of the immune system which increases susceptibility to viral infections[1].

Mechanisms leading to increased susceptibility to infections during pregnancy[1].

- Reduced antiviral cytokine expression, decreased natural killer cell activation, and cytotoxicity along with lowered total number and function of T-cells (specifically CD8+)
- Response to the leptin-adiponectin axis and overexpression of some inflammatory markers such as interleukin-6, tumor necrosis factor -α, and C-reactive protein are seen
- Excessive weight gain disrupts the TH1/TH2 balance in pregnant women, which increases vulnerability

Impact of COVID-19 on Maternal and Fetal Outcomes



The viremia-induced cytokine storm exaggerates the maternal immune system which is linked to the occurrence of placental damage, fetal growth restriction, abortion, or preterm labor[2].

Maternal–fetal interplay following SARS-CoV-2 infection reported histomorphological alterations in infected placenta and adverse pregnancy outcomes[2].

Nutritional strategies to reduce the Risks of COVID-19 in Pregnant Women[1].

Energy
at least approximately 2500 kcal/day

Protein
approximately 3-4 portions per day

Dairy
approximately 4 portions per day

Folic acid supplement
400 mcg/day

Other micronutrients
calcium, iron, choline, omega 3, and vitamin D at WHO recommended levels

Consumption of high-quality protein foods (such as milk or eggs) is recommended in pregnancy[3].

Role of proteins during pregnancy

Proteins[1]

- Are important part of the structure of antibodies and immune system cells.
- Inadequate amount of protein in the daily diet can lead to poor immune function and pregnancy outcomes.
- Protein requirement increases during pregnancy for synthesis of fetal, placental and maternal body proteins that increase with increase in maternal body weight.

Low protein
Low AAs

- Impaired secretion of histotroph
- Impaired embryonic development
- Impaired mTOR cell signaling in mother and conceptus
- Reduced placental angiogenesis, growth, and development
- Reduced supply of nutrients from mother to fetus
- Inducing oxidative stress in mother and conceptus
- Impaired absorption and transport of lipids, lipid-soluble vitamins, and microminerals (e.g. iron and zinc)
- Induction of deficiencies of multiple nutrients

Embryonic/fetal death
Loss of pregnancy
Intrauterine growth restriction
Poor maternal health

Mechanisms and adverse effects of low maternal dietary intake of protein or amino acids (AAs) during pregnancy[3]

Protein-rich foods: The immunity boosters during COVID-19

Protein-rich diets[4]

» E.g. meat, milk, egg, bioactive peptides and others

» Important for enhancing the immune system and the body health.

» Few amino acids have beneficial immune modulatory effects and are used as "immunity regulators" to enhance the immune system functions

Arginine

» stimulate secretion of growth hormone by pituitary gland

» increase T cell production through enlargement of thymus gland

» increase healing activity of the body

» help in cancer prevention

Glutamine

» acts as an oxidative fuel for cell proliferation and rapidly replicating cells

» help in regulation of acid–base balance and transportation of nitrogen between body organs

» increases number of CD8+, CD4+, and T lymphocytes after bone marrow transplantation

Nucleotides

» enhance the maturation of T cells and the activity of natural killer cells

» improve the delayed hypersensitivity in skin

» reverse immunosuppression induced by starvation and malnutrition

» increase resistance against some infections such as *Candida albicans* and *Staphylococcus aureus*

» accelerate the immune responses to vaccines

» increase the titers of antibodies

Recommendations for optimum Protein Intake During Pregnancy

The RDA of proteins for an average Indian women is **45.7 g/day.** Pregnant women require additional proteins to meet the increased demands[5].

Additional Protein requirements during Pregnancy[5]

» Additional protein of **1.2 g/day, 6.1 g/day** and **10.7 g/day** in the **first, second** and **third** trimesters respectively is recommended

» On an average, **6 g protein/day** is recommended as the extra allowance throughout pregnancy

» For a gross weight gain of 10 kg, the safe intake levels of protein are **9.5 g/day** and **22.0 g/day** for the **second** and **third** trimesters respectively

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