Obstetrics

Pregnancy Nutrition

See online here

All women during pregnancy have an increased demand for nutrient supply. When the nutrient intake is compromised, the body uses the stored nutrients, and that makes a pregnant woman weak. Energy demands are the highest in the third trimester of pregnancy. Certain nutrient deficiencies are associated with congenital disabilities and other complications. The increase in energy requirements is due to the increase in body weight of a pregnant woman, the energy needs of the fetus, and physiological changes occurring in the events of pregnancy. There is about 20 percent increase in caloric needs, 50 percent increase in micronutrients, and an additional 350-450 calories are required during 2nd and 3rd trimester. Energy requirements increase up to 12 percent and BMR increases on an average of 10-15 percent.

![Healthy weight gain is essential for strong cognitive development.](chart)

Nutrition in Pregnancy

Many women have a successful pregnancy without meeting the recommended energy intake guides. This is because different adaptive strategies can be used to cater for the increased energy demands during pregnancy such as:

- By **reducing the exertion**, energy demands can be lowered
- By **increasing absorption** of nutrients
- **Reduced BMR**
- **Reduced diet-induced thermogenesis**
- Use of already **stored fat**

These strategies may help in the presence of sub-optimal nutritional status but there is a **physiologic limit** to adjust nutrient metabolism, and hence the growth and development of the fetus may be affected. In the case of an under-nourished woman, nutrient supply is
physiologically driven more to the mother and the fetal growth is compromised to a greater extent.

Weight loss is not at all recommended by dieting during pregnancy even if the mother is morbidly obese. Medicines for weight management should be avoided during the time of conception and pregnancy.

There are no increased energy demands in the first trimester. 340 kcal extra energy is required in the second trimester, and additional energy of 452 kcal is the need of the third trimester. However, there are significant variations in the energy requirements based on weight before pregnancy and individual body height.

Weight gain during pregnancy is due to the combination of the following:

- **Water** (about 62%)
- **Fat mass** (about 30%)
- **Protein** (about 8%)

Adequate plasma volume expansion is directly related to a favorable pregnancy outcome.

**Recommended total weight gain in pregnant women based on pre-pregnancy BMI (kg/m2)**

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Weight Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (BMI &lt; 19.8)</td>
<td>12.5-18.0 kg</td>
</tr>
<tr>
<td>Normal (BMI 19.8-26.0)</td>
<td>11.5-16.0 kg</td>
</tr>
<tr>
<td>High (BMI 26.0-29.0)</td>
<td>7.0-11.0 kg</td>
</tr>
<tr>
<td>Obese (BMI &gt; 29.0)</td>
<td>6.0 kg</td>
</tr>
</tbody>
</table>

For multiple births, the need for nutrients and calories for pregnant women is higher than those who have a single fetus in the womb with the requirement of 40-45 kcal per day.

**Protein**

There is a higher demand for proteins during pregnancy to support weight gain and fetal growth, specifically in the last trimester. Metabolic adaptation increases the efficiency of protein synthesis during pregnancy.

**Recommended protein intakes for pregnant women**

No additional protein requirement is there in the first trimester of pregnancy. Therefore the RDI for protein in women aged 19-50 in the first trimester is 0.75 g per kg per day.

The RDI for protein in women aged 19-50 in the second and third trimester is 1.0 g per kg per day and for women 14-18 years old, it is 1.02 g per kg per day.

The sources of protein are milk, eggs, meat, chicken, cheese, and lentils.

**Carbohydrates**

Carbohydrate metabolism is constantly altered throughout the pregnancy to ensure that the fetus receives an adequate supply of macronutrients even if maternal nutrition is intermittent. Adequate glucose is required for maternal brain metabolism and as a primary energy resource for the fetus.
45-65 % of total energy comes from carbohydrate for adults over 14 years of age. During pregnancy, the recommended dietary allowance for carbohydrate intake is **175 g per day.** This is 45 g more than the carbohydrate requirement of non-pregnant females.

**Dietary Fiber**

Due to high levels of **progesterone**, there is a **decreased GI transit** during pregnancy. This is beneficial in a sense that food is in contact with the absorption sites for a longer period, hence **improved absorption** but it also leads to **constipation**.

Therefore, adequate intake of dietary fiber is necessary to maintain regular bowel habits during pregnancy. The recommended dietary allowance for pregnant women aged 19-50 years for dietary fiber intake is **22 g per day**. To meet the recommended daily needs for both carbohydrates and fiber, **low energy density food** or **low GI food sources** should be taken such as fruits, cereals, whole grain, and vegetables.

**Fats**

Fatty acids fulfill **half of the energy needs** of the fetus during early pregnancy. In the later stages, the fetus forms its own fatty acids. **Long-chain polyunsaturated fatty acids** are essential for **brain growth and development** in infants, specifically in the third trimester, when the growth of nerve tissue is at its highest.

The fetus has a limited ability to synthesize long-chain polyunsaturated fatty acids and therefore is dependent upon the **placental supply**. Obese women who have insulin resistance and those who are thin with little body fat, are more in need of dietary fat to maintain adequate supply to the fetus. Recommended doses for essential fatty acids and omega 3 long-chain polyunsaturated fatty acids for pregnant women aged 19-50 years are as follows:

- **Linoleic acid**: 10 g per day
- **Alpha-linolenic acid**: 1 g per day
- **Total omega-3 long-chain polyunsaturated fatty acids**: 115 mg per day
Minerals

Iron

Iron deficiency is the most common deficiency in pregnant women. It leads to impaired red blood cell function and anemia, which in turn increases the risk of post-partum infections, hemorrhage, heart failures, and mortality.

The recommended dose for pregnant women of ages 14-50 is 27 mg per day. Iron requirements during the first trimester are less than the others, but these doses are recommended to build the iron stores for the last trimester of pregnancy.

The sources of iron in the diet are dried beans, animal protein, fortified food and any food that is cooked in the iron utensils.

Calcium

There is increased demand for calcium during pregnancy but this need is largely fulfilled by greater maternal calcium absorption, retention, and turnover in the first trimester. Its demand is high because of the continuous building of fetal tissue, especially in the third trimester. The recommended allowance for pregnant women aged 19-50 is 1,000 mg per day. It is the same as that for non-pregnant and non-breastfeeding women.

The dairy products and green leafy vegetables are highly rich in calcium needed for Vitamin D absorption and are recommended for pregnant ladies.
Zinc

Any deficiency in zinc during pregnancy can result in neural tube defects, premature delivery, low birth weight, and other complications. The recommended allowance for pregnant women aged 14-18 is 10 mg per day, and for women aged 19-50, it is 11 mg per day.

A well-balanced diet meets the requirement of the zinc for the pregnant ladies, extra supplementation is not recommended when iron supplements cross 60 mg per day.

Selenium

Increased demands of selenium during pregnancy account for the promotion of fetal growth and selenoprotein synthesis. The recommended allowance for pregnant women aged 14-50 is 65 μg per day.

Magnesium

Deficiency of magnesium results in uterine hyper-irritability, fetal retardation, cerebral palsy and pregnancy-induced hypertension. The recommended allowance for pregnant women aged 14-18 is 350 mg per day, for women aged 19-30, it is 360 mg per day, and women aged 31-50, it is 360 mg per day.

Iodine

High rates of growth in fetus increase the maternal needs for iodine. Deficiency of iodine can result in abortion, stillbirths, birth defects and neurological defects. The most vulnerable group in case of iodine deficiency is pregnant women. The recommended allowance for pregnant women aged 14-50 is 220 μg per day and iodized salt can prevent iodine deficiency.

Copper

There is copper accumulation in the fetus, amniotic fluid, and newly formed maternal tissue. This increases copper demand during pregnancy. The recommended allowance for pregnant women aged 14-50 is 1.3 mg per day.

Sodium

To maintain the increased plasma volume during pregnancy, sodium requirements are more than normal. Acceptable intake for pregnant women aged 14-50 is 460-920 mg per day.

Potassium

There is an overall small increase in potassium needs during pregnancy, but this does not require supplemental intake. Hence the adequate intake is the same as for non-pregnant women, i.e., 2,800 mg per day.

Sulphate

The higher sulfate requirements during pregnancy can be met from water and protein-rich diet that has sulfur-containing amino acids.
Fluoride

It is necessary for the developing deciduous teeth of the fetus. There are no increased fluoride requirements during pregnancy. The recommended allowance is 3 mg per day.

Vitamins

Vitamin A

Sufficient supplies of vitamin A play their role in birth weight, circumference, and length of head, and the duration of gestation. It helps in glycoprotein synthesis and cellular growth. Sub-optimal levels are associated with increased maternal motility. The recommended allowance for pregnant women aged 19-50 is 800 μg REs per day. There is only a 10 percent increase in the daily requirements, greater than this can be harmful to the fetus.

The source of Vitamin A is green leafy vegetables and orange vegetables.

Vitamin D

Deficiency of vitamin D during pregnancy results in decreased fetal growth. This is due to the effect of vitamin D deficiency on maternal calcium homeostasis. The recommended dose for pregnant women aged 19-50 is 5 μg of vitamin D per day. The source of Vitamin D is fortified milk.
Vitamin E

The recommended dose for pregnant women aged 19-50 is **7 mg per day**. It is the same as that for non-pregnant women. It can be extracted from animal fats and proteins.

Vitamin K

The recommended dose for pregnant women aged 14-50 is **60 μg per day**. It is the same as that for non-pregnant women. Its rich sources are green leafy vegetables, eggs, tomatoes, and dairy products.

Folate

The decrease in serum and red cell folate levels is teratogenic in early pregnancy. Any deficiency leads to neural tube defects, megaloblastic anemia of pregnancy, atherosclerosis in mother and cervical dysplasia. The recommended dose for pregnant women aged 14-18 is 800 μg per day and dose for pregnant women aged 19-50, it is 1,000 μg per day.

Thiamin (vitamin B1)

The deficiency of vitamin B1 during pregnancy affects the growth of the fetus and increases the risk of congenital malformations such as cleft lip and palate, sudden infant death syndrome, and pre-eclampsia. The recommended dose for pregnant women aged 14-50 is **1.4 mg of vitamin B1 per day**.

Riboflavin

Deficiency of riboflavin can cause pre-eclampsia. The recommended dose for pregnant women aged 14-50 is **1.6 mg of riboflavin per day**.

Riboflavin is found in green vegetables, eggs, cheese, milk, and fish. Routine intake of riboflavin is not recommended.

Niacin

The increased demands for niacin during pregnancy are related to the increased energy requirements and growth of the fetus. The recommended dose for pregnant women aged 14-50 is **18 mg niacin per day**.

Pantothenic acid

The recommended dose for pregnant women aged 14-50 is **5 mg per day**. It is the same as that of non-pregnant women.

Vitamin B6 (pyridoxine)

It is essential for the nervous system development, and any deficiency will affect the brain of the fetus. It is essential for the metabolism of protein, carbohydrate, and lipid. The recommended dose for pregnant women aged 14-50 is **1.9 mg of vitamin B6 per day**.
Vitamin B12 (cobalamin)

It is essential for normal hematological and neurological functions. The recommended dose for pregnant women aged 14–50 is 2.6 μg per day. It is found in proteins extracted from animals.

Biotin

It is essential for fetal development, and the fetus depends on maternal dietary intake. The recommended dose for pregnant women aged 14–50 is 30 μg per day. This amount is 5 μg more than that required for non-pregnant women.

Its rich sources are fortified grains, green leafy vegetables, and dried beans.

Vitamin C

Any deficiency in vitamin C during pregnancy is associated with ruptured placental membranes, infections, and premature births. The recommended dose for pregnant women aged 14–18 is 55 mg per day. The dose for pregnant females aged 19-50 is 60 mg per day.

The sources of Vitamin C are fruits and vegetables without routine supplementation as a balanced diet can meet the requirements of vitamin C.
Water

The need for water intake during pregnancy is **3.1 liters per day** in total. About 2.3 liters of this need is fulfilled by drinking water and the rest through food and other fluids.

Prenatal Nutrition: Breastfeeding or Formulas?

*Breastfeeding* is recommended as the best option for the newborn. It should be exclusively practiced for 6 months and is recommended for up to 12 months. Breast milk prevents allergies and helps improve immunity. A formula is a healthy option in the absence of breastfeeding.

References


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