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Nutrition vs Malnutrition in Prenatal Period for Pregnant and Fetus Care

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ABSTRACT
The importance of nutrition in pregnancy cannot be overstated. It maintains maternal energy requirements, provides substrate for the development of new fetal tissues, and builds energy reserves for postpartum lactation. Recommendations for prenatal nutrition typically focus on weight gain and dietary intake in pregnancy.The metabolic demands of pregnancy require supplemental dietary intake. Additional energy (caloric) intake is required to support recommended weight gain. Because energy requirements in pregnancy are increased by 17% over the nonpregnant state, a woman of normal weight should consume an additional 300 kcal/d. This energy should be of high nutrient density. Nutrient density reflects the amount of protein, vitamins, and minerals per 100 kcal of food.

Keyword: Nutrition ,Malnutrition ,Diet ,Pregnancy ,Fetus

INTRODUCTION

Childbirth is a crucial and important stage for both the mother and the fetus.
This stage controls the nature of future generations in terms of general health and genetic diseases that may appear in newborns as a result of maternal malnutrition.Nutritional improvements play an important role in the birth of healthy with normal growth babies, and improve the chances of survival of the newborn.
Proper nutrition also guarantees the mother good breastfeeding and protects the mother from the risk of anemia,pre-eclampsia,and bleeding that may lead to death.It is necessary for every pregnant woman to drink plenty of fluids to keep the body hydrated and maintain a normal blood pressure level.
if you take nutritional supplements, your healthcare provider may prescribe a special type that contains iron in the prenatal period to maintain high hemoglobin levels, avoid obstetric hemorrhage, and improve wound healing especiallyafter a cesarean section.

Nutritional requirements during pregnancy

During pregnancy,a woman needs many and varied nutrients to ensure healthy fetal growth. She needs proteins that help the development of the fetus, and carbohydrates which are a source of energy,and fats that contribute to the dissolution of vitamins.

nutrients such as iron,calcium,iodine and folic acid are essential for the proper formation of the neural tube and thyroid gland functions..

How does the mother's diet affect the growth of the fetus?

When the mother follows a balanced diet during pregnancy,this positively affects the growth of the fetus and the safety of his internal organs and protects him from deformities resulting from a lack of micronutrients .

The pregnant mother should take care to eat healthy, balanced and variety foods, also she should practice some light exercises that improve the blood circulation to the fetus and also monitor the gained weight during pregnancy , which indicates healthy growth of the fetus and the arrival of all the necessary needs for him.

Healthy food and a healthy lifestyle are much better than relying on pharmaceutical supplements, so doctors prescribe pharmaceutical supplements in limited quantities and at specific times during pregnancy.Proper nutrition also leads to the ideal weight at birth.

Weight Gain and Pregnancy

An infant's birth weight is affected by many factors, including the mother's pre-pregnancy body mass index (BMI) and weight gain during pregnancy. BMI is defined as weight in kilograms divided by the square of height in meters

Underweight is defined as a BMI of less than 18.5 kg/m2. Normal weight is defined as a BMI of 18.5-24.9 kg/m2. Overweight is defined as a BMI of 25-29.9 kg/m2. Obesity is defined as a BMI that exceeds 30 kg/m2.

[2] Birth weight is affected by prepregnancy BMI, independent of actual weight gain during pregnancy. Women who are underweight are at increased risk for low birth weight babies; women who are overweight or obese are at increased risk for macrosomic infants. Macrosomic infants are at increased risk for shoulder dystocia and brachial plexus injuries.Morbid obesity is defined by a BMI exceeding 35 kg/m2. Morbidly obese pregnant patients are at increased risk for preeclampsia, nonreassuring fetal heart tracings, meconium aspiration, late intrauterine fetal death, and early neonatal death.Birth weight is also affected by maternal weight gain during pregnancy. Although weight should be gained throughout pregnancy, it is most critical in the second trimester. Even if overall weight gain is poor, birth weight is usually acceptable as long as second-trimester weight gain is appropriate.

The Institute of Medicine's (IOM's) 2009 pregnancy weight gain recommendation guidelines for singleton pregnancies are as follows:

Underweight - 28-40 lbs
Normal weight - 25-35 lbs
Overweight - 15-25 lbs
Obese - 11-20 lb

What is The ideal way to take nutritional supplements?

One of the important rules during and before the pregnancy is to eat the necessary nutrients such as vegetables,fruits,lean protein, and whole grains that contain important vitamins and minerals.

Vitamins and minerals in Pregnancy

Vitamin A: Vitamin A, a fat-soluble vitamin, is important for maintenance of maternal visual function. Its main influence is on the retina, but it also aids glycoprotein synthesis and promotes cellular growth and differentiation in other tissues. Vitamin A is found in green leafy vegetables and yellow-orange vegetables. The nonpregnancy RDA is 700 mcg, and the pregnancy RDA is 770 mcg. The lactation RDA is 1300 mcg. Well-balanced diets provide the RDA for women who are pregnant or lactating, so, routine supplementation is not recommended. Doses exceeding 15,000 IU/d, often used to treat acne, are associated with an increased risk of birth defects and should not be used in pregnancy. Alpha-carotene, a vitamin A precursor, is not teratogenic.

Vitamin B-1: Vitamin B-1, also known as thiamine, is a water-soluble B-complex vitamin. It is involved in carbohydrate metabolism. Its food sources include milk and raw grains. The RDA is 1.1 mg. In both pregnancy and lactation, the RDA increases to 1.4 mg. Well-balanced diets provide the pregnant and lactating RDA. Routine supplementation is not recommended. Supplementation may need to be considered in patients with hyperemesis.

Vitamin B-2: Vitamin B-2, also known as riboflavin, is a water-soluble B-complex vitamin. It is also involved in the release of energy from cells. Vitamin B-2 is found in green vegetables, milk, eggs, cheese, and fish. The RDA is 1.1 mg. In pregnancy, the RDA increases to 1.4 mg; in lactation, it increases to 1.6 mg. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

Vitamin B-6: Vitamin B-6, also known as pyridoxine, is a water-soluble B-complex vitamin. It is important in protein, carbohydrate, and lipid metabolism. It is also involved in the synthesis of red blood cells. Vitamin B-6 is found mostly in vegetables. The RDA is 1.2-1.5 mg. The pregnancy RDA is 1.9 and in lactation, the RDA

increases to 2 mg. Well-balanced diets provide the pregnant and lactating RDA. Routine supplementation is not recommended.

Vitamin B-12: Vitamin B-12, also known as cobalamin, a water-soluble B-complex vitamin, is essential for DNA synthesis and cell division making it key for embryogenesis. It helps form red blood cells and maintains the nervous system. [10] It is found in animal proteins. Deficiency is usually secondary to compromised intestinal function. Dietary deficiency is rare, but is occasionally encountered in persons who follow strict vegan diets. The RDA is 2.4 mcg. The pregnancy RDA is 2.6 mcg. The RDA increases to 2.8 mcg with lactation. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

Vitamin C: Vitamin C, also known as ascorbic acid, is a water-soluble vitamin with numerous functions including reducing free radicals and assisting in procollagen formation and the absorption of iron. [7] Vitamin C is found in fruits and vegetables. Chronic deficiency impairs collagen synthesis and leads to scurvy. The RDA is 75 mg. The pregnancy RDA is 85 mg. The RDA increases to 120 mg with lactation. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

Vitamin D: Vitamin D, a fat-soluble vitamin, is found in fortified milk. Exposure to ultraviolet light is necessary for vitamin conversion. Deficiency of vitamin D is associated with tooth enamel hypoplasia. Vitamin D is also responsible for the promotion of healthy bone growth eyesight and skin in the fetus.The RDA in both pregnancy and lactation is 5 mcg. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

In 2011, ACOG reported insufficient evidence to support a recommendation for screening all pregnant women for vitamin D deficiency. Routine screening for vitamin D levels is not recommended in the United States

Vitamin E: Vitamin E, a fat-soluble vitamin, is an important antioxidant. It is found in animal protein and fats. The RDA is 15 mg. The pregnancy RDA is 15 mg; the lactation RDA is 19 mg. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

Vitamin K: Vitamin K, a fat-soluble vitamin, is required for synthesis of clotting factors VII, IX, and X and therefore essential for normal coagulation. It is found in green leafy vegetables, tomatoes, dairy products, and eggs. There is limited maternal to placental transfer during gestation. The American Academy of Pediatrics recommends that neonates be given intramuscular supplementation at birth. [17, 18] The RDA is 90 mg. In pregnancy and lactation, the RDA stays at 90 mg. Well-balanced diets provide the RDA for women who are pregnant or lactating. Routine supplementation is not recommended.

Folic acid: Folic acid, a water-soluble B-complex vitamin, is important for DNA synthesis and cell replication. It is found in fortified grains, dried beans, and leafy greens. Deficiency in pregnancy has been linked with maternal megaloblastic anemia and fetal neural tube defects. The RDA is 0.4 mg. The RDA is 0.6 mg during pregnancy and 0.5 mg during lactation.In 1998, the US Food and Drug Administration (FDA) mandated fortification of grains with folate. The degree of fortification was calculated to provide only 0.1 mg/d of dietary folate. Fortification was enacted to avoid having supplemental folate mask evidence of vitamin B-12 deficiency in susceptible populations, especially in the elderly. Cereal fortification has resulted in a 32% decrease in the prevalence of elevated maternal serum alpha-fetoprotein values [19] and a 25% decline in the prevalence of open neural tube defects. Most recently, the FDA extended this fortification to corn masa flour given the incidence of neural tube defects in the Hispanic American population.

Despite fortification, the average American diet has insufficient folic acid and routine supplementation of 0.4 mg/d is recommended for healthy women. Folate supplements should be administered 3 months prior to conception and throughout the first trimester. If the mother had a prior child affected by a neural tube defect, supplementation in the subsequent pregnancy should be increased to 4 mg/d.The US Preventative Services Task Force recommends a daily supplement of folic acid (0.4 to 0.8 mg) for all women who are planning or capable of pregnancy.

Niacin: Niacin is a water-soluble vitamin involved in the release of energy from cells. It is found in poultry, fish, and nuts. Deficiency results in pellagra. The RDA is 14 mcg. In pregnancy, the RDA increases to 18 mcg, and to 17 mcg in lactation. Well-balanced diets provide the RDA for women who are pregnant and lactating. Routine supplementation is not recommended. folic acid ,It is a type of vitamin B that reduces birth problems related to the brain, spinal cord,and neural tube defects ,taking folic acid before and during the first trimester of pregnancy also prevents premature birth and low birth weight in newborn.Taking 400 micrograms daily of folic acid during the trimester of pregnancy is considered a sufficient dose.

Iron: When taking iron, it is preferable to be from an animal source ,because it is absorbed faster than the iron from a plant source.To enhance iron absorption ,it is preferable to eat foods rich in vitamin C with it,such as orange juice and strawberry.calcium shouldn't be taken at the same time as iron because it impairs iron absorption.When taking protein you need only 71gm\day .

to know the amount of protein in your daily food look at this table:

Cottage cheese	226gm	Contain 28gm protein

Chicken breast	86gm	Contain 26gm of protein
One egg	50gm	Contain 6gm of protein
Cup of milk	237ml	Contain 8 gm of protein

How to take calcium supplements?
The pregnant mother needs calcium for herself and her fetus as it supports the strength of bones and teeth and supports the circulatory,muscular, and nervous system.calcium deficiency during pregnancy leads to fetal osteomalacia and rickets ,to know the best food to provide calcium, and How much calcium is present in different foods?

Cottage cheese	43 gm	333 mlgm
Orange juice	237 ml	349ml gm
Milk	237 ml	299 ml gm
Salmon fish	85 gm	181 ml gm

Efforts of organizations in therapeutic nutrition for pregnant women:
According to the world health organization (WHO) , a pregnant woman who is properly nourished will have a healthy pregnancy with a healthy baby, on the other hand the woman who suffers from malnutrition will have a poor pregnancy with a diseased baby.
It is believed that half of the world's pregnant women suffer from anemia, and 9.8 million of pregnant women suffer from night blindness.
It is estimated that 1901 million pregnant women in Africa and southeast Asia suffer from serum retinol deficiency and micronutrient deficiency, which reduces the fetus weight and poses a threat to its life.
the impact of malnutrition on pregnant woman and its impact on the mental achievement of newborns:
researchers at king's college london and bristol university in britain have shown that a diet with high sugar and fats during pregnancy affects the mental health of newborns, and excessive consumption of these foods by the mother leads to changes in the genes responsible for the development of attention deficit, hyperactivity disorder,in newborns during childhood which known as ADHD.
Children with ADHD suffer from difficulty concentrating and low academic achivement.

When does malnutrition occur?
When the calories (energy from protein and fats) , consumed by an individual are not enough for the vital processes of the body.
malnutrition occurs in poor countries and communities that suffer from prolonged famine.
Malnutrition is accompanied by major metabolic disorders, resulting in immunodeficiency and several diseases that may lead to death.

Malnutrition divided into two types :
1- malnutrition:
The person lacks the fundamental nutrients and energy-providing elements, which negatively affects his growth and normal development.
Malnutrition divided into 2 types:
1- macronutrient under nutrition:where the body lacks the large elements such as protein, fats and carbohydrates.
2- micronutrients under nutrition; where the body lacks some vitamins and minerals.
2-overnutrition;
Overnutrition is considered malnutrition because it leads to an abnormal body, it happens when the person has excessive amounts of large nutrients (proteins and carbohydrates) meaning high calories that will lead to obesity.

Diagnosis criteria of malnutrition:
- some methods are used to diagnose malnutrition
- Malnutrition is diagnosed by measuring the upper arm circumference. If it is less than 115mm this is evidence of malnutrition.
- If the child is underweight compared to others of the same age and height ,he is considered malnutrition according to world health organization child growth standards.
- Presence of extended edema in the lower extremities with exclusion of other causes of edema.
- also some medical tests are used to diagnose the malnutrition:

1-a complete blood count (CBC): is performed to detect certain types of white blood cells that are associated with malnutrition.
2- Prealbumin test : should also be performed which gives a strong indication of low protein deficiency.
Medical complications that require the child to be admitted to the hospital:

- When a child is exposed to severe malnutrition ,there are some symptoms that can't be treated at home and can't be compensated for with food or nutritional supplements, but rather hospitalization is required.
- Presence of an extended edema from the lower extremities to the face.
- loss of appetite, persistent vomiting,altered mental status, severe anemia ,hypoglycemia, eye damage resulting from vitamin E deficiency,frequent and profuse diarrhea.
- Dehydration and infection with malaria,pneumonia,meningitis,severe skin infection, fever of unknown cause.

Treatment of severe malnutrition in hospital:
Treatment usually begins with some specialized nutrients to restore the normal metabolism function during from 1 to 7 days.
When the child starts to improve ,doctors start adding some foods to improve the general condition and introduce therapeutic milk f-100 ,this stage continues for about 3 days.
If the child is still breastfeeding, it is necessary to continue breastfeeding and give him a lot of fluids.
The child's presence in the hospital is important for him to ensure weight gain, regain growth and recover.

Special Considerations
Lactose intolerance Calcium can be obtained from lactose-free dairy products or calcium-enriched orange juice or soy milk. If the daily calcium intake is less than 600 mg (one serving of calcium-rich food), patients will benefit from calcium supplementation.The total daily divided dose should be 500-1000 mg. The maximum tolerable daily divided dose is 2500 mg. If a woman is unable to tolerate any dairy products and has limited exposure to sunlight, she may also require supplemental vitamin D (400 IU/d).
Vegetarian and vegan diets . Vegetarian diets with multiple variations are becoming increasingly common. Well-balanced vegetarian diets that include dairy products provide adequate energy and nutrient intake and do not require special supplementation. Vegan diets include no animal products whatsoever, including, meat, dairy, and eggs. A vegan diet, even if well balanced in all other respects, may be deficient in calcium, vitamins D and B-12, and essential fatty acids. These deficiencies can be resolved with fortified food products.
Adolescents . The pregnant adolescent may also require careful attention to energy intake. Younger women may have increased energy requirements to satisfy the demands of ongoing maternal growth. Special attention should be taken with the adolescent population to focus on food rather than nutrition and to have an individualized approach regarding their eating habits. Consultation with nutritionists and counselors may be helpful if these dietary issues arise.
Multiple gestations . Women with multiple gestations have increased nutritional requirements. The recommended weight gain for twin gestations is 16.8-24.5 kg for normal BMI, 14.1-22.7 kg for overweight patients, and 11.3-19.1 for obese patients. This additional weight gain requires approximately 150 kcal/d over the dietary requirements of singleton pregnancies. Women with triplets should gain 50 lb. Nutrient requirements are also increased in multiple gestations. Routine prenatal vitamin and mineral supplementation is recommended. The suggested amount of folic acid supplementation is 1 mg/d. Elemental iron requirements are increased, often requiring more frequent doses of iron supplements. Lastly, vitamin B-6 requirements are increased. The recommended supplementation for women with multiple pregnancies is 2 mg/d.
Hyperemesis gravidarum is a common complication of early pregnancy. Mild hyperemesis in the first trimester, when weight gain is not yet essential to fetal growth, is unlikely to affect fetal growth or development. Initiation of prenatal vitamins three months prior to conception appears to reduce the severity and frequency of pregnancy associated nausea and vomiting. Frequent, small meals and snacks as opposed to large food boluses are thought to reduce symptoms. If this fails, patients may respond to vitamin B6, 25 mg 3 times a day or vitamin B6 plus doxylamine. When hyperemesis precludes all oral intake, severe dehydration and ketosis may result, which requires inpatient management and intravenous rehydration.
Eating disorders are common in women during their reproductive years. Anorexia nervosa commonly results in amenorrhea and is not often observed in pregnancy. However, bulimia may complicate pregnancy. Unless severe, bulimia is unlikely to affect fetal development in the first trimester. If it becomes persistent, the severe energy restriction may compromise fetal growth. Providers should treat the disorder before the pregnancy and should provide general nutrition advice. Psychiatric and dietician referrals should be considered.
A systematic review by Galbally et al reported that the incidence of anorexia nervosa during pregnancy has risen sharply in recent years. The researchers noted that pregnant women with anorexia nervosa are at higher risk for poor outcomes, such as stillbirth, low birth weight infants, and preterm birth.

Malabsorption syndromes and inflammatory bowel disease may compromise fetal growth. Increased ultrasonographic surveillance may aid in early detection of a growth-impaired pregnancy. Special diets and supplements may be required. These patients should be treated in conjunction with a gastroenterologist.
Poverty nearly doubles the rate of insufficient weight gain. Nutritional counseling may assist patients who are impoverished in identifying low-cost foods with high-nutrient density. The federal Women, Infants, and Children (WIC) program, administered through the US Department of Agriculture Food and Nutrition Service, is a valuable resource for women who are impoverished (see Food and Nutrition Service).
International issues In the United States, the vast majority of pregnant women enjoy good nutrition. However, in much of the developing world, pregnant women may experience nutritional deficiencies not commonly observed in the United States.
Micronutrient supplementation may be beneficial to the maternal-child health of developing nations. The increased serum hemoglobin level associated with iron supplementation can result in a greater attack rate of clinical malaria. Malarial prophylaxis is indicated when large doses of elemental iron are given to pregnant women in endemic areas.

CONCLUSION

Therapeutic nutrition is a large and important science that includes all organs of the body, the body works like a beehive in terms of system and organization.
The safety of the body's organs is based on each organ receiving its needs in a permanent and balanced manner, this is to ensure that metabolic and vital processes are completed optimally.
The body is a large entity with interconnected organs, even if one of the organs suffers from a problem.
Therefore, health organizations and countries had to give nutrition great attention because it is closely linked to the health of the mother, who is the nucleus of society, and the health of the child, who constitutes the future of the nation.
nutritional care for the mother should be given to every girl who is about to give birth, not only during pregnancy.
There must also be a great societal awareness of the value of healthy food and trends towards better healthy habits to ensure good health. and strong bodies, we always say that prevention is better than cure.

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