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Nutrition Requirement before, during and after pregnancy

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ABSTRACT

Nutrition before and during pregnancy has a profound effect on the development of infants. This is a rather critical time for healthy fetal development as infants rely heavily on maternal stores and nutrient for optimal growth and health outcome later in life. Prenatal nutrition addresses nutrient recommendations before and during pregnancy. Birth weight of the newborn at delivery reflects the sufficiency and the quality of maternal nutrient for the fetus during pregnancy. Prenatal nutrition has a strong influence on birth weight and further development of the infant. The present paper reviews the role of prenatal nutrition in pregnancy.

Keywords: Pregnancy, Birth weight, prenatal nutrition

INTRODUCTION

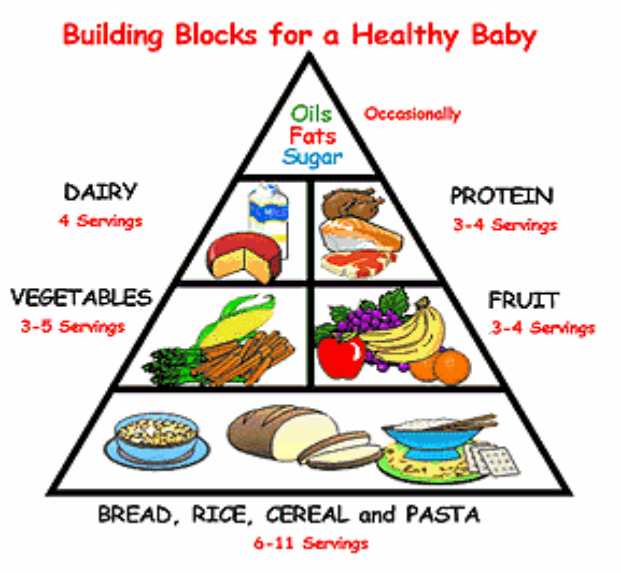
In a precursory study into the link between nutrition and pregnancy in 1950 women who consumed minimal amounts over the eight week period had a higher mortality or disorder rate concerning their offspring than women who ate regularly, attributed to the fact that the children born to well-fed mothers had less restriction within the womb.[1] Not only have physical disorders been linked with poor nutrition before and during pregnancy, but neurological disorders and handicaps are a risk that is run by mothers who are malnourished, a condition which can also lead to the child becoming more susceptible to later degenerative disease(s).[2] 23.8% of babies are estimated to be born with lower than optimal weights at birth due to lack of proper nutrition.[3] It is very important that expecting mothers should change their personal habits like smoking, alcohol, caffeine, using certain medications and street drugs as soon as they know they are pregnant or even when they are planning to conceive. All these can affect the development of the organs like brain, which happen in early stages of pregnancy. They can cause irreparable damage to the growing foetus.[4] The expecting mothers should be very calm and peaceful, also focussed on what they should do for a healthy pregnancy.

Nutrition requirement before pregnancy

Pre-natal nutrition

As with most diets, there are chances of over-supplementing, however, as general advice, both state and medical recommendations are that mothers follow

instructions listed on particular vitamin packaging as to the correct or recommended daily allowance (RDA).



- Protein is needed for the buildup of muscles, uterus, breasts, blood supply, and baby's tissues. Low protein intake is related to smaller-than-average weight babies who may have health problems. Pregnant and breastfeeding women need around 71 grams of protein per day.
- Folate is a vitamin that is required to build protein tissues. Low folate levels are linked to birth defects, such as spina bifida. These defects form early in pregnancy, often before women know they are pregnant. The dietary reference intake for folate is 400 micrograms per day before pregnancy, 600 micrograms per day during pregnancy, and 500 micrograms per day while breastfeeding.
- Calcium is needed for strong bones. Pregnant and breastfeeding women 19 and older need around 1,000 milligrams per day or 1,300 milligrams per day for women under 19 years of age. Low zinc levels during pregnancy can cause long labor and small babies who may have health problems. The dietary reference intake for zinc is 11 milligrams per day or 12 milligrams per day for women under 19 years of age. Women who are breastfeeding need about the same amount (12 milligrams per day or 13 milligrams per day for women under 19).
- Iron deficiency is common in pregnant women. Both mother and baby need iron for their developing blood supplies. A developing baby also stores iron for use after birth. This increases the mother's iron needs. It is practically impossible to get enough iron from food. All pregnant women need around 27 milligrams per day. The need for iron declines after birth but women who are breastfeeding still require about 10 milligrams a day.
- Magnesium and zinc supplementation for the binding of hormones at their receptor sites.
- Regular vitamin D supplementation decreases the chances of deficiencies in adolescence. More importantly, it is known to reduce the likelihood of rickets with pelvic malformations which make normal delivery impossible.
- Regular vitamin B12 supplementation, again is known to reduce the chances of infertility and ill health.
- Omega-3 fatty acids increase blood flow to reproductive organs and may help regulate reproductive hormones.[5] Consumption is also known to help prevent premature delivery and low birth weight.[6] The best dietary source of omega-3 fatty acids is oily fish. Some other omega-3 fatty acids not found in fish can be found in foods such as flaxseeds, walnuts, pumpkin seeds, and enriched eggs.[5]
- The DHA intake from an average diet during pregnancy is only 80 mg DHA per day, based on a paper in the Journal of Nutrition, 2005 (Denomme et al. 135: 206-211).

- A minimum 300 mg DHA daily is suggested based on a 1999 NIH body of experts recommending needed levels to support fetal brain development and visual acuity benefits. Most notably, the last trimester is the most critical period for DHA during pregnancy for the baby's brain growth in the womb.
- DHA (Docosahexaenoic acid, an omega-3 long chain polyunsaturated fatty acid) is found in every cell in our bodies. It is critical for brain,eye and central nervous system development and functioning. During pregnancy, developing babies rely on their mothers to get needed DHA. Since DHA is derived from the foods we eat, the content of DHA in a mother's diet determines the amount of DHA passed on to her developing baby. Unfortunately, the majority of pregnant womens fail to get the recommended amount of DHA in their diets and DHA is not found in most prenatal vitamins.

- A 2003 study published in the journal Pediatrics showed children whose mothers took a DHA supplement during pregnancy scored higher on intelligence tests at four years of age than children of mothers not taking DHA supplements.
- A 2004 study published in Child Development found that babies whose mothers had high blood levels of DHA at delivery had advanced attention spans into their second year of life. During the first six months of life these infants were two months ahead of babies whose mothers had lower DHA levels.
- Other research studies suggest breastfed babies have IQs of six to 10 points higher than formula-fed babies. Medical and nutritional experts attribute this difference to the DHA infants receive while nursing. (Obstetrics & Gynecology, 2003).
- In a trial of women receiving DHA supplementation during the third trimester, the average length of gestation increased six days (Obstetrics & Gynecology, 2003).
- Research has found low levels of DHA in mother's milk and in the red blood cells of women with postpartum depression. (Journal of Affective Disorders, 2002). Some scientists believe increasing levels of maternal DHA may reduce the risk of postpartum depression.

Nutrition requirement of mothers during pregnancy

The conception and the subsequent weeks afterwards is the time when it is at its most vulnerable, as it is the time when the organs and systems develop within. The energy used to create these systems comes from the energy and nutrients in themother's circulation, and around the lining of the womb, such is the reason whycorrect nutrient intake during pregnancy is so important.

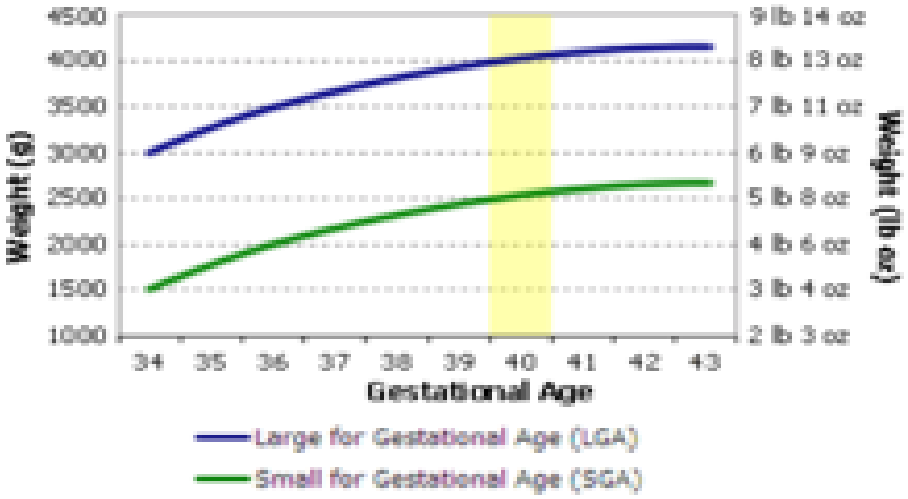


Fig 2: Nutrients requirement during pregnancy

Vitamins requirement during pregnancy

Vitamin A

Vitamin A plays an important role in developing and maintaining eye health. It also regulates cell growth and protects fertility and the immune system. During pregnancy, vitamin A is particularly important for ensuring optimal eye development in the embryo (a fertilised egg in the very early stages of pregnancy, before it takes on human characteristics). Vitamin A regulates the way in which cells differentiate to form different parts of the eye including the:

- Conjunctiva – the mucous membrane which covers the front of the eyes and the eyelids;
- Cornea – the front section of the eye;
- Photoreceptor rod cells (rod shaped cells in the eye's retina which sense dim light and help individuals to see at night); and
- Cones cells (cells in the eyes which sense bright light and are important for seeing in daylight).

It also plays an important role in regulating the development of the spinal cord, vertebrae, limbs, heart and ears of the embryo.

Health effects

Vitamin A deficiency is uncommon in developed countries where prevalence of malnutrition is low. However, it is associated with a range of adverse health outcomes including eye and skin disorders, infection and respiratory disorders. Keratomalcia (night blindness) is a common early symptom of vitamin A deficiency and is most common in pregnant women who are vitamin A deficient. Vitamin A deficiency during pregnancy is also associated with an increased risk of the following conditions/ complications:

- Iron-deficiency anaemia – evidence suggests that combined vitamin A-iron supplementation is most effective in reducing the incidence of iron-deficiency anaemia during pregnancy;
- Maternal mortality – although further research is needed, one study also showed that women who took vitamin A supplements while they were pregnant were 40% less likely to die during pregnancy or childbirth than those who did not take the supplements;
- Premature birth;
- Intrauterine growth retardation;
- Low birth weight;
- Bleeding during pregnancy due to premature detachment of the placenta from the wall of the womb (abruptio placentae).

Requirement

it is recommended that pregnant women ≥ 19 years of age consume 800µg of vitamin A retinol equivalents daily compared to 700µg for non-pregnant women. Pregnant women aged 14-18 years should consume 700µg of vitamin A retinol equivalents per day, the same quantity which is required by non pregnant women of their age. It is important to note that consumption of excessive quantities of vitamin A may lead to acute or chronic toxicity. During pregnancy this increases the risk of miscarriage, stillbirth and birth defects in the infant. Individuals who use vitamin A containing products (including skin creams for the treatment of skin disorders such as acne) should not use vitamin A supplements at the same time.

Folate

Folate is an essential micronutrient involved in DNA synthesis, which means that without adequate levels of folate, cells cannot divide and replicate and growth is restricted. At times of increased cell growth (e.g. pregnancy), an individual's folate requirement increases.

Health effects

Folate deficiency during pregnancy increases the risk of neural tube defects in the infant. An estimated 70% of neural tube defects could be prevented by ensuring that women consume adequate amounts of folate before and in the first trimester of pregnancy. Folate deficiency may also cause haemolytic anaemia (anaemia or a lack of red blood cells caused by the premature death of these red blood cells) in pregnant women.

Requirement

A woman's folate requirement increases by 50% during pregnancy and is particularly high in the first trimester of pregnancy. The recommended daily intake of folate for all pregnant women is 600µg, compared to 400µg for non-pregnant women. It is important to note that this

requirement does not include the additional folate necessary to prevent neural tube defects, as folate intake prior to becoming pregnant largely determines the risk of neural tube defect. This is because the neural tube is formed in the very early stages of pregnancy, before the woman realises she is pregnant. It is therefore also important for women of childbearing age who are planning a pregnancy or might become pregnant to ensure they consume the recommended quantities of folate for at least one month pre-pregnancy.

Vitamin B12

Vitamin B12 is essential for DNA synthesis (production of new DNA) as well as maintaining normal blood and neurological (brain) function.

Health effects

Vitamin B12 deficiency has a range of adverse health effects for pregnant women including:

- Anaemia and symptoms of anaemia, for example:
  - Skin pallor;
  - Low energy;
  - Fatigue;
  - Reduced exercise tolerance;
  - Shortness of breath;
  - Palpitations.
- Neurological complications including:
  - Sensory disturbance (altered sensations) in the arms and legs;
  - Motor disturbance (disturbed movement);
  - Memory loss;
  - Mood change;
  - Visual disturbances;
  - Impaired bowel and bladder control.

Requirement

A woman's vitamin B12 requirement increases during pregnancy in relation to the requirement of the growing foetus. The recommended daily intake of vitamin B12 for all pregnant women is 2.6µg, compared to 2.4µg for non-pregnant women. A woman's vitamin B12 requirement rises to 2.8µg per day whilst she is breastfeeding. There is no evidence that consuming too much vitamin B12 is unsafe.

Vitamin C

Vitamin C is a water soluble vitamin, also called ascorbate or L-ascorbic acid. Unlike most other animals, humans and primates cannot produce vitamin C in their bodies, and must therefore obtain their requirement from dietary sources.

Vitamin C is an antioxidant which may protect us from some diseases and ageing. It is also important for the production of collagen (a component of skin) bones, cartilage, muscles and blood vessels. Vitamin C is an essential micronutrient for ensuring good dental health for the pregnant woman and her foetus, as it plays an important role in the development of healthy gums. Adequate vitamin C intake also increases an individual's absorption of non-haem iron. Vitamin C is found in all body tissues, but is found in high concentrations in the adrenal and pituitary glands (hormone producing glands), body fluids, leukocytes (small white blood cells), eye and brain tissues. However, it cannot be stored in body tissues for long periods of time, and must therefore be consumed every day. The concentration of vitamin C in a woman's blood declines progressively and by up to 50% during pregnancy. This is due to the vitamin C which is used by the foetus and hemodilution (a process through which the blood is diluted by incorporating more fluid).

Health effects

Vitamin C deficiency causes scurvy which has severe and sometimes fatal consequences if not treated. Further research is needed to determine whether or not there are associations between vitamin C deficiency and maternal complications including pre-eclampsia (hypertension during pregnancy) and abruptio placentae (premature detachment of the placenta from the womb).

Requirement

During pregnancy, women require an additional 15mg of vitamin C per day. Women aged 14-18 should consume 55mg of vitamin C (compared to 40mg when they are not pregnant). Those aged ≥18 years of age should consume 60mg per day (compared to 45mg per day pre-pregnancy).

Vitamin D

Vitamin D has an important function in assisting the body to absorb calcium and phosphorus. It is also an important nutrient for optimal immune function, maintaining healthy skin and muscle strength.

Health effects

Vitamin D deficiency in a pregnant woman is an important risk factor for the development of osteoporosis later in life. In the foetus it can lead to childhood rickets (a disease which retards skeletal development and causes weak bones).

Requirement

A woman's vitamin D requirement of 5.0µg daily does not increase during pregnancy. Most women will obtain their vitamin D requirement through sun exposure alone, although women with limited sun exposure will require Vitamin D supplements. Mineral requirements during pregnancy

Iron

Iron is a component of a number of essential proteins, including haemoglobin which is essential for transporting oxygen in the blood.

Health effects

Inadequate iron intake can lead to a range of iron deficiency disorders, from low iron stores at the mild end of the spectrum to iron deficiency anaemia at the severe end. Symptoms of these disorders include fatigue, jaundice and reduced work capacity.

Calcium

Calcium's key function is to ensure the proper growth and structure of teeth and bones.

Health effects

Low calcium intake throughout life, and particularly in periods of rapid growth such as pregnancy, increases the risk of osteoporosis later in life, particularly after menopause.

Iodine

Iodine is an essential trace element which assists in growth, metabolism and tissue development. Iodine also plays a role in the body's energy production and oxygen consumption.

Health effects

Iodine deficiency can result in a range of adverse health effects collectively referred to as iodine deficiency disorder. In the foetus/infant of an iodine deficient woman, these include:

- Poor foetal outcomes including:
  - Miscarriage;
  - Stillbirth;
  - Congenital abnormalities;
- Poor infant outcomes including:
  - Higher rates of infant mortality;
  - Neurological cretinism (a congenital condition of impaired thyroid hormone secretion which impairs cognitive development);
  - Mental deficiency with deaf mutism;
  - Spastic diplegia (spastic paralysis of the limbs) and squint;
  - Myxoedymateous cretinism (a type of cretinism in which physical development is impaired) and dwarfism (very short stature;
  - Psychomotor effect (movement effects).
- In adults these include:
  - Goitre (enlargement of the thyroid gland);
  - Hypothyroidism (lack of hormones produced by the thyroid gland);
  - Impaired mental and physical development.

Zinc

Zinc is a micronutrient which plays a role in maintaining the structural integrity (normal form) of proteins and regulates gene expression (how genes and genetic traits are replicated in the DNA). It is mainly stored in bones and muscle tissues.

Health effects

Zinc deficiency during pregnancy is associated with an increased risk of pregnancy complications, including:

- Pre-eclampsia (high blood pressure and urinary protein concentrations during pregnancy);
- Premature rupture of membranes (when a woman's amniotic sac/pregnancy water breaks before she experiences contractions); and
- Preterm delivery.

It is also associated with foetal abnormalities including growth retardation and other congenital abnormalities.

Requirement

The recommended daily intake of zinc rises during pregnancy. Women aged 14-18 require 10mg of zinc per day (compared to 8mg pre-pregnancy), while those aged ≥ 19 years requiring 11mg of zinc per day (compared to 8mg pre-pregnancy).

Magnesium

Magnesium is a micronutrient which works with more than 300 enzymes involved in energy generation and glycolysis (break down of sugars and carbohydrates). It also plays a role in regulating the function of other minerals including calcium and potassium. About half the magnesium in the human body is found in bones and a further third is stored in muscle and soft tissues.

Health effects

Maternal magnesium deficiency increases the risk of pre-eclampsia and pre-term delivery. There is also some evidence of an association with low birth weight. Moderate-severe deficiency is also associated with an increased risk of hypercalcaemia (excessive levels of calcium in the blood).

Requirement

A woman's magnesium requirement during pregnancy increases in comparison with pre-pregnancy requirements and varies with age. Women aged:

- 14-18 years require 400mg of magnesium per day;
- 19-30 years require 350 mg per day;
- ≥31 years require 360mg per day.

Selenium

Selenium is a trace mineral which is an antioxidant and plays an important role in regulating the function of the thyroid (a gland which produces hormones which regulate the metabolism).

Health effects

During pregnancy selenium deficiency increases the risk of low birth weight and pre-eclampsia.Selenium may be toxic at high levels and result in fever, gastro-intestinal symptoms and even death. However it is not known how much selenium is needed to cause toxicity.

Requirement

It is recommended that pregnant women consume 65µg of selenium per day (compared to 60µg per day for non-pregnant women).

Recommended nutrients during pregnancy

Table 1: Daily Recommended Dietary Allowance for Vitamins, Micronutrients and Macronutrients for Pregnancy.

Vitamins, Micronutrients and Macronutrients	Unit	Recommended Dietary Allowance (RDA) for Pregnancy		
		14–18 Years	19–30 Years	31–50 Years
Vitamin A (retinol)	µg	750	770	770
Vitamin B1 (thiamin)	Mg	1.4	1.4	1.4
Vitamin B2 (riboflavin)	Mg	1.4	1.4	1.4
Vitamin B3 (niacin)	Mg	18	18	18
Vitamin B5 (pantothenic acid)	Mg	*6*	*6*	*6*
Vitamin B6 (pyridoxine)	Mg	1.9	1.9	1.9
Vitamin B7 (biotin)	µg	*30*	*30*	*30*

Vitamin B9 (folate)	µg	600	600	600
Vitamin B12 (cobalamine)	µg	2.6	2.6	2.6
Vitamin C (ascorbate)	Mg	80	85	85
Vitamin D (cholecalciferol)	IU	15	15	15
Vitamin E (tocopherol acetate)	Mg	15	15	15
Calcium	Mg	1300	1000	1000
Chromium	G	*29*	*30*	*30*
Copper	µg	1000	1000	1000
Iodine	µg	220	220	220
Iron	Mg	27	27	27
Magnesium	Mg	400	350	360
Selenium	µg	60	60	60
Zinc	Mg	12	11	11

Foetal development during pregnancy

Gestation is the period of embryo development from conception to birth.Gestation is about 40 weeks in humans and is divided into three trimesters, each spanning 3 months. Gestational stages, on the other hand, are based on physiological fetal development, which include blastogenesis, embryonic stage and fetal stage. Blastogenesis is the stage from fertilization to about 2 weeks. The fertilized egg or the zygote becomes a blastocyst where the outer layer and the inner cell mass differentiate to form placenta and the fetus respectively. Implantation occurs at this stage where the blastocyst becomes buried in the endometrium. Embryonic stage is approximately from 2 weeks to 8 weeks. It is also in this stage where the blastocyst develops into an embryo, where all major features of human are present and operational by the end of this stage. Fetal stage is from 9 weeks to term. During this period of time, the embryo develops rapidly and becomes a fetus. Pregnancy becomes visible at this stage.

Embryo at 2 month Fetus at 4 month Fetus at 8 month

During the early stages of pregnancy, since the placenta is not yet formed, there is no mechanism to protect the embryo from the deficiencies which may be inherent in the mother's circulation. Thus, it is critical that an adequate amount of nutrients and energy is consumed. Additionally, the frequent consumption of nutritious foods helps to prevent nausea, vomiting, and cramps.[7] Supplementing one's diet with foods rich in folic acid, such as oranges and dark green leafy vegetables, helps to prevent neural tube birth defects in the baby. Consuming foods rich in iron, such as lean red meat and beans help to prevent anemia and ensure adequate oxygen for the baby.[8] A necessary step for proper diet is to take a daily prenatal vitamins, that ensure their body gets the vitamins and minerals it needs to create a healthy baby. These vitamins contain folic acid, iodine, iron, vitamin A, vitamin D, zinc and calcium.[9]

Recommended Food hygiene during pregnancy

It is advised for pregnant women to pay special attention to food hygiene during pregnancy in addition

to avoiding certain foods in order to reduce the risk of exposure to substances that may be harmful to the developing fetus. This can include food pathogens and toxic food components, alcohol, and dietary supplements such as vitamin A.[6]

Dietary vitamin A is obtained in two forms which contain the preformed vitamin (retinol), that can be found in some animal products such as liver and fish liver oils, and as a vitamin A precursor in the form of carotenes, which can be found in many fruits and vegetables.[6] Intake of retinol, in extreme cases, has been linked to birth defects and abnormalities. However, regular intake of retinol is not seen as dangerous. It is noted that a 100 g serving of liver may contain a large amount of retinol, so it is best that it is not eaten daily during pregnancy, something which is also the same with alcohol intake in binge drinking.

Excessive amounts of alcohol have been proven to cause fetal alcohol syndrome. The World Health Organization recommends that alcohol should be avoided entirely during pregnancy, given the relatively unknown effects of even small amounts of alcohol during pregnancy.[10]

Pregnant women are advised to pay particular attention to food hygiene and to avoid certain foods during pregnancy in order to minimize the risk of food poisoning from potentially harmful pathogens such as listeria, toxoplasmosis, and salmonella. Pregnant women are therefore advised to avoid foods in which high levels of the bacteria have been found, such as in soft cheeses. Listeria are destroyed by heat and therefore pregnant women are advised to reheat ready-prepared meals thoroughly. Pregnant women should also wash their fruit and vegetables very thoroughly in order to minimize risk. Salmonella poisoning is most likely to come from raw eggs or undercooked poultry.[6] Maternal obesity has a significant impact on maternal metabolism and offspring development.[11] Insulin resistance, glucose homeostasis, fat oxidation and amino acid synthesis are all disrupted by maternal obesity and contribute to adverse outcomes.[11] Modification of lifestyle is an effective intervention strategy for improvement of maternal metabolism and the prevention of adverse outcomes.[11]

Recommended prenatal nutrients during pregnancy

Nutrient	Recommendation (Extra = Above RDA)	Maximum/Total amount
Energy	Increase by 200 kcal (840 kJ) per day in last trimester only.	RDA
Proteins	Extra 6 g per day	51 g per day
Thiamin	Increase in line with energy; increase by 0.1 mg per day	0.9 mg per day
Riboflavin	Needed for tissue growth; extra 0.3 mg per day	1.4 mg per day
Niacin	Regular supplementation/diet of substance. No increase required.	RDA
Folate	Maintain plasma levels; extra 100 µg per day	300 µg per day
Vitamin C	Replenish drained maternal stores; extra 120 mg per day	50 mg per day
Vitamin D	Replenish plasma levels of vitamin 10 µg per day.	RDA
Calcium	Needs no increase	RDA
Iron	Extra 3 mg per day needed	RDA
Magnesium, zinc, and copper	Normal supplementation or consumption.	RDA
Iodine	Extra 100 µg per day.	250 µg per day[12][13][14][15]

Folate requirement in in pre-and peri-conception.

Folic acid, which is the synthetic form of the vitamin folate, is extremely critical both in pre-and peri-conception.[6] Deficiencies in folic acid may cause neural tube defects; women who had 4 mg of folic acid in their systems due to supplementing 3 months before childbirth significantly reduced the risk of NTD within the fetus. This is now advocated by the UK department

of health, recommending 400 µg per day of folic acid. The development of every human cell is dependent on an adequate supply of folic acid. Folic acid governs the synthesis of the precursors of DNA, which is the nucleic acid that gives each cell life and character. Folic acid deficiency results in defective cellular growth and the effects are most obvious on those tissues which grow most rapidly.[16] Leafy green vegetables, such as cabbage, broccoli and greens are all good sources of naturally occurring form of folic acid, folate.

Along with neural tube development, folate affects DNA synthesis in multiple ways. Folate is involved in the construction of purines and pyrimidines, the building blocks of nucleic acids.[17] Folate is also necessary to make s-adenosylmethionine (SAM), which acts as a methyl donor in the synthesis of DNA.[17] Because of its role in these important mechanisms, fetal DNA would be significantly altered if a maternal folate deficiency is present. One possible outcome is DNA mutation, which could prevent normal gene expression. For example, a tumor-suppressing gene might be turned off, altering normal immune function in preventing cancer growth.[17] Thompson et al.[18] examined the relationship between maternal supplementation of folate and iron during pregnancy and incidences of acute lymphoblastic leukemia (ALL) in their children. Increased rates of ALL were found in children whose mothers did not take iron and folate supplements. Iron alone did not seem to reduce the risk of developing ALL, however iron in combination with folate was shown to have a protective effect in decreasing the risk for ALL. Thompson and his associates (2001), concluded that maternal folate supplementation throughout pregnancy plays an important role in reducing the risk for childhood ALL.[18]

Water, an important aspect of nutrition throughout pregnancy.

During pregnancy, one's mass increases by about 12 kg.[19] Most of this added weight (6 to 9 L) is water[19] because the plasma volume increases, 85% of the placenta is water[20] and the fetus itself is 70-90% water. This means that hydration should also be considered an important aspect of nutrition throughout pregnancy. To ensure healthy hydration during pregnancy, the European Food Safety Authority recommends an increase of 300 mL per day compared to the normal intake for non-pregnant women, taking the total adequate water intake (from food and fluids) to 2,300 mL, or approximately 1,850 mL/ day from fluids alone.[21]

Proper nutrition is important after delivery to help the mother recover, and to provide enough food energy and nutrients for a woman to breastfeed her child. Women having serum ferritin <= 70 µg/L may need iron supplements to prevent iron deficiency anaemia during pregnancy and postpartum.[22][23]

During lactation, water intake needs increase to compensate for the loss of water through milk production. Milk is made of 88% water, and the European Food Safety Authority therefore recommends that breastfeeding women increase their water intake by about 700 mL/day, giving an adequate volume of 2,700 mL/day (from food and drink), or approximately 2,200 mL/day from fluids.[21]

Practical Recommendations for Pregnant Mothers

The following general tips can be helpful to pregnant women. It would be beneficial to maintain adequate physical activity to meet energy needs from the food consumed. Eating a balanced diet would be optimal for healthy pregnancy results. To prevent problems like dehydration and constipation, it is important to drink enough fluids, especially water, to support blood volume increases during pregnancy. It is recommended to accompany regular meals with a daily prenatal vitamin supplement that has sufficient folic acid and iron content.

If the fetus is predicted to have low birth weight, it would be ideal to increase caloric intake, which can be done by having extra Food Guide Servings daily. If the fetus is predicted to have high birth weight, smaller and more frequent meals should be consumed to allow better weight management. Moderate sugar intake, such as fruit juices, is also suggested. It is essential to limit food and beverages with high calories and salt content.

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