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Disha Bindra
College of Home Science, G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand, India

Disha Bindra
College of Home Science, G.B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand, India

Pregnancy: A Physiologically Demanding Phase

Disha Bindra

Abstract
It has been peculiarly noticed that in developing countries including India young women, pregnant women, and their infants and children frequently experience a cycle where undernutrition, a form of malnutrition (macronutrient and micronutrient) and repeated episodes of infection, including parasitic infections, lead to adverse consequences that can continue from one generation to the next. Among parasitic infections, malaria and intestinal helminths coexist widely with micronutrient deficiencies and contribute importantly to anemia and this cycle of retarded growth and development. In somewhat more limited or focal geographic settings, other parasitic diseases (e.g., schistosomiasis, filariasis) contribute similarly to this cycle. It is undoubtedly much better to enter a pregnancy free of infection and nutritionally replete than the various alternatives (Steketee, W. Richard, 2003).

Keywords: young women, pregnant women, schistosomiasis, filariasis

Introduction

Nutrition Before Conception

Everyone knows that a woman needs to eat well once she conceives. But her nutritional status at the moment of conception is also important because her weight and vitamin status at the time of conception can influence her pregnancy, delivery and baby's health.

Ideally, the time to prepare nutritionally for pregnancy is well before conception. A woman who had adequate nutrient stores, particularly of folic acid and with healthy weight can reduce the risk of maternal and fetal complications during pregnancy. In addition to healthy diet selection, avoiding cigarettes, alcohol, and other drugs is also important when contemplating pregnancy (Mohan, LK *et al.*, 1999).

A women contemplating pregnancy needs to pay careful attention to her weight. Being either, lean or overweight carries their own risks. Lean women with BMI less than 18 have increased risk of preterm delivery and delivering a low birth weight infant. At the other hand overweight and obese women have high increased risk of several problems, including stillbirth.

In addition, obese women are at higher risk of High blood pressure (of 100/140 mm of Hg), Gestational Diabetes, Preeclampsia (a condition marked by high blood pressure, fluid retention, and albuminurea), prolonged labor and difficulty in initiating and continuing breastfeeding.

Nutritional Status before Pregnancy

A good diet derived from all the food groups is important to accomplish the vitamins' and minerals' requirement of the body, especially folic acid, a nutrient needed to prevent neural tube defects. These are referred to as the most common and a major birth defect prevalent worldwide. It includes spinal bifida and other malformations resulting from defective or delayed closure of the neural tube in the embryo. Spinal bifida refers to those congenital disorders associated with lack of bone encasement of the spine, which, in turn causes permanent damage to the spinal cord or spinal nerves. It may result in varying degrees of paralysis, loss of bladder or bowel control and cognitive impairment. So, in order to reduce the risk all the women of child bearing age should consume recommended amount of 400micrograms of folic acid each day from fortified foods or supplements.

Conception and Implantation

During ovulation, the ovum, along with its attached cells, is expelled directly into peritoneal cavity (space between the membranes lining the walls of the abdomen and pelvic cavities) and enters one of the fallopian tubes where the fertilization takes place. From fertilization to full term baby, the process of fetal development is typically divided into three phases as follows:

Blastomeric stage

This is the first stage of gestation, during which the tissue proliferation by rapid cell division begins. The first division of zygote produce a solid sphere of cells, the morula, but during subsequent divisions the cells pulls away from the center and form a hollow cavity called blastocyst. The inner cells in this growing mass will form the fetus; the outer layer of cells will become the placenta. This stage lasts for about two weeks after which developing ovum finally gets implanted in the uterine wall.

Embryonic stage

It extends from the end of the second week through the eight week after conception. This stage is also a period of *organogenesis*. By the time the embryo is eight weeks old, all the main internal organs have formed, along with development of main external features. It is the time when the environment has the greatest impact on the developing embryo. Any nutrient deficiencies or intake of harmful substances can result in congenital abnormalities or spontaneous abortions, thus this stage is a critical stage of development. The growth period is divided into three phases:

In the first phase, growth takes place only by an increase in the number of cells, i.e., replication of cells takes place which is known as hyperplasia. Increase in the number of cells requires folic acid and vitamin B12. Both these vitamins plays an important role in the synthesis of nucleic acids which must be produced each time a cell divides. Inadequate diet during a critical period of cell division can depress cell number which cannot be made good by taking an adequate diet at a later date. However, inadequacy in diet during cell growth can be overcome when adequate nourishment is made available. Hence, the effects of malnutrition on cell number is permanent, whereas that on cell size is reversible.

In the second phase, new cells continued to be formed, i.e proliferation continues but those already formed now begin to increase in size, a process called *hypertrophy*. This requires amino acids and vitamin B6, both of which are needed for synthesis of body proteins.

In the final phase, cell division slows down and the growth is mainly due to increase in cell size.

Physiological Changes in Pregnancy

The mother's body is undergoing various changes during pregnancy, guided by changing levels of hormones. Uterine, breast and adipose tissues grows; blood volume expands (haemodilution –anaemia) and gastrointestinal motility slows. All of these changes have nutritional and dietary implications for pregnant women.

Changes of the Circulatory System during Pregnancy

Blood Volume and Composition: Blood volume expands approximately 50% by the end of pregnancy. The increase is needed to provide for extra blood flow to the uterus, extra metabolic needs of the fetus, and increased perfusion of other organs, especially the kidney. This increase in blood volume is accompanied by smaller increase in red cell volume i.e 18 - 30%, which results in decreased levels of red blood cells and hemoglobin. This fall is due to relatively greater increase in plasma volume than of red cell volume, often referred to as hemodilution.

Also Blood Count is interpreted as anemia by the physician if the hemoglobin falls below 10.5 grams per 100 ml and the hematocrit drops below 30 percent. There is a decrease in serum albumin, other serum proteins, and water-soluble vitamins. The decline in serum albumin may be the result of fluid accumulation.

Changes in Cardiovascular and Pulmonary Function

During pregnancy cardiac output Increases by 40% and cardiac size increases by 12%. The increase is needed to meet the extra blood flow to the uterus, placenta and kidney.There is little change in systolic blood pressure but diastolic blood pressure decreases during the first two trimesters because ofperipheral vasodilatation, but returns to pre pregnancy values in the third trimester. Maternal oxygen requirements increases, making the pregnant woman feel dyspneic. Adding to this feeling of dyspnea, is the growing uterus pushing the diaphragm upward but. Compensation for this results from more efficient pulmonary gas exchange. Patients with a diseased heart need to be advised to get plenty of rest and to report any shortness of breath or unusual symptoms to their physician.

Changes in Gastrointestinal Function

During pregnancy the function of the gastrointestinal (GI) tract changes in several ways that affects nutritional status. Peristalsis is slowed because of the production of the hormone progesterone, which decreases tone and gastro intestinal motility of smooth muscles. This slowing enhances the absorption of nutrients because nutrients spends more time in the small intestine. On the other hand, slower motility can contribute to nausea and vomiting, Cravings and aversions to foods. Increased progesterone concentrations relax the uterine muscle to allow for fetal growth while also decreasing GI motility with increased reabsorption of water. This often results in constipation. In addition, later in pregnancy a pressure on the stomach
from the growing uterus can cause regurgitation and gastric reflux resulting in Heartburn.

Changes of Glands of the Endocrine System during Pregnancy

a. Placenta. It is the conduit for exchange of nutrients, oxygen, and waste products and acts as a temporary endocrine gland during pregnancy. It produces large amounts of estrogen and progesterone by 10 to 12 weeks of pregnancy. Placental size can be 15% to 20% lower in fetuses with intrauterine growth restriction (IUGR).

b. Parathyroid Gland. This gland increases in size slightly in order to meet the increased requirements for calcium needed for fetal growth.

c. **Posterior Pituitary**. Near the end of term of pregnancy, the posterior pituitary will begin to secrete oxytocin that was produced in the hypothalamus and stored there. It will serve to initiate labor.

d. Anterior Pituitary. At birth, the anterior pituitary will begin to secrete prolactin. This stimulates the production of breast milk.

Changes in Renal Function

The glomerular filtration rate (GFR) increases by 50% during pregnancy. The kidneys must work extra excreting the mother's own waste products plus those of the fetus. Due to the increased renal blood flow, the clearance of waste products also increases which leads to increased loss of glucose, amino acids, and some water soluble vitamins. Enlarging uterus displaces the urinary bladder upward, leading to increased urinary frequency. There is increased production of steroid

hormones by the placenta and adrenal cortex, which enhance reabsorption of sodium, chlorine, and water by renal tubules.

Changes of the Respiratory System during Pregnancy

Due to an increase in basal metabolic rate and increased body size, the total amount of oxygen used by the mother increases. The respiratory rate rises from 18 to 20 to compensate for increased maternal oxygen consumption which is needed to meet the demands of the uterus, the placenta, and the foetus. The total expansion of diaphragm is decreased due to elevation by growing uterus, consequently the respiratory rate is increased to maintain adequate ventilation**.**

Changes of Body Temperature during Pregnancy

A slight increase in body temperature in early pregnancy is noted. The temperature returns to normal at about the 16th week of gestation.The patient may feel warmer or experience "hot flashes" caused by increased hormonal level and basal metabolic rate.

Weight Gain during Pregnancy

Weight gain during pregnancy helps in nourishing the baby and accumulating calories to produce milk for breastfeeding. However weight gain should be at a steady pace. Inconsistent weight gain, too little or too much, can affect baby adversely. Gaining less weight during pregnancy can lead to premature delivery and low birth weight. It may also cause developmental delays and chronic health problems in babies. On the contrary, gaining excessive weight increases risk of high blood pressure (pre-eclampsia) and gestational diabetes. It may also lead to an overweight or obese baby which may necessitate a cesarean birth. Weight gained during pregnancy is a total of fetal and maternal tissues and fluids. Weight gain recommendations are based on BMI prior to pregnancy. Women of normal weight (BMI= 18.5-24.9) should gain 11-16 kgs over the course of pregnancy.

With a singleton gestation, less than half of the total weight gain of a normal-weight pregnant woman resides in the fetus, placenta, and amniotic fluid. The remainder is in maternal reproductive tissues (breast tissues and uterus), interstitial fluid, blood volume, and maternal adipose tissue. Gradually increased, subcutaneous fat in the abdomen, back and upper thigh serves as an energy reserve for pregnancy and lactation.

Food And Nutrition Requirements during Pregnancy

Energy: A pregnant woman require added calories to support energy expenditure of developing fetus, placenta, increased breast tissue, and fat stores. support increased work load on the heart and the lungs. It also supports the metabolic demands of pregnancy and fetal growth. Metabolism increases by 15% in the pregnancy. It supports weight gain primarily in the second and third trimester. The energy requirement for the pregnant female is the same as for a non pregnant female in the first trimester (2400kcal) and thereafter increases by 340 to 360 kcal/day during the second trimester and by another 112 kcal/day in the third trimester. Inadequate energy intake during the first trimester is associated with higher rates of premature delivery, fetal death, and malformation of infant's central nervous system. During second and third trimester, restricting intake results in slowed fetal growth leading to underdevelopment of fetus for his or her age.

Protein

There is an additional protein requirement for pregnancy to support the synthesis of maternal, placental and fetal tissues. Protein requirement increases throughout gestation and is maximum during the third trimester. The RDA of 0.8 g/kg/ day of protein for non-pregnant women is the same as that for pregnant women in the first half of pregnancy. Needs increase in the second half, based on 1.1g/kg/day of pre pregnant weight. For each additional fetus, another 25 g/day of protein is recommended; this may be as much as 175 g/day for the normal weight woman carrying a twin gestation who is consuming 3500 kcal/day. Protein deficiency during pregnancy has adverse consequences. Limited intakes of protein and energy usually occur together, making it difficult to separate the effects of energy deficiency from those of protein deficiency.

Carbohydrate: Carbohydrate provide the main source of extra calories during pregnancy. Food choices should emphasize complex carbohydrate such as whole grain breads, fortified cereals, rice and pasta. In addition to supplying vitamins and minerals, these foods can increase fiber intake substantially. A fiber rich diet is recommended during pregnancy to help prevent constipation. This 135 to 175 g/day is recommended to provide enough calories in the diet to prevent ketosis and maintain appropriate blood glucose during pregnancy.

Fats: Dietary fat provides vital fuel for the mother and for the development of maternal, fetal, and placental tissues. The pregnant woman's body also stores fats to support breastfeeding after child birth. Very low fat diets are not recommended for pregnancy. Such diets are unlikely to supply sufficient amount of essential fatty acids, fat soluble vitamins or calories. The needs for essential fatty acids during pregnancy are slightly higher than for non-pregnant women. The recommendation for the amount of linoleic acid and polyunsaturated fatty acids (linoleic acid) 13gm/day and for the amount of linolenic acid, polyunsaturated fatty acids in the diet is 1.4 g/ day.

Vitamins

Water Soluble Vitamins: Folic acid, which is the synthetic form of the vitamin folate, is extremely critical both in pre-and peri-conception. Women who had 4 mg of folic acid in their systems, supplementing three months before conception, significantly reduced the risk of NTD within the fetus. For pregnant adult women, the recommended intake is 600 µg/day. Folic acid requirements increase during pregnancy for maternal erythropoiesis, DNA synthesis, and fetal and placental growth. The deficiencies in folic acid may cause neural tube defects, reduced rate of DNA synthesis, mitotic activity in individual cells, increased incidence of congenital malformations, including cleft lip and palate. The leafy green vegetables, such as cabbage, avocado, broccoli and greens are all good sources of naturally occurring form of folic acid, folate.

Vitamin B6: During pregnancy, blood levels of both vit.B6 and the active coenzyme pyridoxal phosphate are lower then those of non pregnant women. This may reflect either inadequate intake or normal physiologic change of pregnancy. RDA for non pregnant women is 1.3mg and that for pregnant women is 1.9 mg. Hence an increased intake of 0.6mg is recommended.

Vitamin B6 is actively transported from maternal to foetal circulation, reducing the potential of deficiency in the fetus.

Vitamin B12: Vitamin Bl2 is found almost exclusively in foods of animal origin (meats, dairy products) therefore vegetarians are at maximal risk for dietary vitamin Bl2

deficiency and should be supplemented. The recommended amount of Vitamin B12 for pregnant woman is 2.6µg/day. Deficiencies of both folate and vitamin B12 have been related to depression in adults. There is A huge concern regarding inadequate amounts of these nutrients during fetal brain development affecting infant cognitive and motor development.

Vitamin C: The amount of vitamin C recommended for pregnant woman is 85mg/day i.e 10 mg higher than non pregnant women. Ascorbic acid is involved in collagen synthesis and functions as an antioxidant. A daily consumption of food sources rich in Vitamin C should be consumed on a daily basis. At this time there are no recommendations for intake of supplemental vitamin C as the demand can be met with dietary intake only.

Fat Soluble Vitamins

Vitamin A: Vitamin A is required for growth, embryogenesis, and differentiation of epithelial tissues. Vitamin A concentrations are correlated with birth weight, head circumference, length, and gestation duration. Low maternal vitamin A concentration can result in reduced kidney size in newborns. Premature infants have low vitamin A stores and poor lung function.

An increased dosage of vitamin A may increase the risk ofbirth defects and are proved to be teratogenic in nature.The tolerable upper intake level of retinol for women of child bearing age is 3000 mg (10,000IU)/day.

Vitamin D: Vitamin D and its metabolites cross the placenta and appear in fetal blood in the same concentration as in maternal circulation. Vitamin D enhances immune function and brain development. Maternal vitamin D deficiency is associated with neonatal hypocalcemia, which is clearly manifested in inadequate fetal bone mineralization, hypoplasia of tooth enamel.

Vitamin D blood concentrations are often low in infants born to vitamin D-deficient mothers.

Vitamin D supplementation may be needed to reach desired serum concentrations of 5µg/day but supplement above RDA should be avoided because of potential toxicity.

Vitamin E: Vitamin E requirements are increased during pregnancy. Recommended amount for non-pregnant is 15mg/day and an increase of 2mg per day is needed to support fetal growth. Although deficiency during pregnancy is speculated to cause miscarriage, preterm birth, and IUGR. Vitamin E deficiency specifically has not yet been reported in human pregnancy. Vitamin E is an important lipophilic antioxidant. Of the many tocopherols and tocotrienols, alpha tocopherol is the most biologically active form and is found in all lipoproteins (Whitney, E.N. *et al.*, 1999) [5].

Vitamin K: Vitamin K has an important role in bone health as well as in coagulation homeostasis, so adequate amounts during pregnancy are vital. Vitamin K deficiency has been reported in women who have had hyperemesis gravidarum (characterized by intractable vomiting and in weight loss, dehydration, electrolyte imbalance) and gastric bypass. The transfer of vitamin K from mother to fetus appear to be minimal, so no increase is recommended. Hence RDA for both pregnant and non-pregnant women is same i.e 90µg/day.

Minerals

Calcium: Hormonal factors strongly influence calcium metabolism in pregnancy. Somatotropin hormone (from the placenta) and estrogen, maintains maternal serum calcium by enhancing maternal absorption of calcium across the gut. Approximately 30 g of calcium is accumulated during pregnancy, almost all of it in the fetal skeleton (25 g). The remainder is stored in the maternal skeleton, held in reserve for the calcium demands of lactation. Overconsumption of calcium in food form is not common however, elevated serum level of calcium can be the result of excess antacid ingestion for heartburn or gastro esophageal reflux disease. Recommended amount during pregnancy is 1000mg/day and increases by 200kcal during last trimester because accumulation of calcium in substantial quantities takes place mainly during last trimester.

Iodine: Adequate gestational iodine is associated with a higher intelligence quotient in the child and attention deficit may be associated with milder iodine deficiency. Supplementation before the end of the second trimester protects the fetal brain from the effects of deficiency. To ensure adequate iodine, food is often fortified withiodized salt. Yet many people worldwide are at risk for iodine deficiency caused by low intake of sea products and fish, food grown in iodine-deficient soils etc. If urinary iodine levels are low, supplementation is needed and the amount recommended during pregnancy is 220µg/day approximately 70µg more than non-pregnant women (150mg).

Iron: A marked increase in the maternal blood supply during pregnancy greatly increases the demand for iron. Normal erythrocyte volume increases by 20% to 30% in pregnancy. A pregnant woman must consume an additional 700 to 800 mg of iron throughout her pregnancy. 500 mg for hematopoiesis, and 250 to 300 mg for fetal and placental tissues. Per day recommended intake of iron is 27mg during pregnancy, 10mg more than that of non-pregnant women. Inadequate iron consumption may lead to poor hemoglobin production, followed by compromised delivery of oxygen to the uterus, placenta, and developing fetus.

Magnesium: The full-term fetus accumulates 1 g of magnesium during gestation. In the last trimester magnesium is deposited at the rate of 6mg per day. The recommended intake is 350mg/day during pregnancy while for non-pregnant women it is 310mg /day. It helps build strong bones and teeth; regulates insulin and blood sugar levels; builds and repairs tissue.

Phosphorus: Phosphorus is found in a wide variety of foods and deficiency is rare. The recommended amount is 700mg/day. Hypophosphatemia can be life threatening because phosphorous is important in energy metabolism as a component of adenosine triphosphate (ATP) and must be promptly replenished, as with intravenous phosphorous.

Zinc: Zinc deficiency is highly teratogenic and leads to congenital malformations, abnormal brain development in the fetus, and abnormal behavior in the newborn. Women with low plasma zinc concentrations are at 3 times greater risk for delivering an infant weighing less than 2000g. Zinc is available in red meat, seafood, including oysters, and unrefined grains. Extra supplementation is usually not required and daily recommended amount is 11mg.

Complications of Pregnancy and their Nutritional Management:

Constipation: It is a common complaint of pregnancy

especially during the last trimester. This problem results from reduced intestinal motility, which slows passage of undigested food residue through the large bowel, resulting in increased absorption of water. Hence the feces become dry, hard and difficult to expel. he decreased physical activity and a diet low in fiber also contribute to the problem. Pregnant women become constipated if they fail to consume adequate water. Increased consumption of fluids, fiber-rich foods, and dried fruits (especially prunes and apricots), and nuts usually controls these problems.

Gestational Diabetes Mellitus (GDM): It is a condition in which abnormal glucose tolerance exist only during pregnancy and resolves after delivery. Glucose intolerance may be associated with obesity. The hormones of pregnancy increases insulin resistance and the rate of GDM. Women diagnosed with GDM are at risk of developing type 2 diabetes mellitus and cardiovascular disease later in life and have higher incidences of preclampsia and operative delivery.It can often be controlled through diet, although some cases may require insulin therapy.

Heartburn: The term heart burn is a misnomer, because it has nothing to with heart. Two factors contribute to the heart burn during gestation: The hormone –mediated changes of pregnancy result in relaxation of lower esophageal sphincter (group of muscles located between esophagus and stomach). The increasing pressure of the enlarged uterus on the intestines and stomach.These two factors in combination, may result in reflux of food and acid from the stomach into the esophagus. Relief may occur by suggesting that the pregnant woman eat frequent small meals and not lying down soon after meals. Occasionally discomfort can be relieved by antacids, if prescribed by the physician. The mild morning sickness can usually be overcome by the use of high carbohydrates foods like biscuits, toasts early in the morning. Small frequent meals are better than large ones. Fatty and rich foods, highly seasoned and flavored foods may be restricted if nausea continues. In case of severe persistent vomiting medical examination becomes necessary. Correction of dehydration and electrolyte imbalances is important. Ample amounts of fluids, carbohydrates and water soluble vitamins should be given.

Pregnancy induced Hypertension: During pregnancy hypertension may occur which may be mild or severe. In mild pregnancy hypertension, the blood pressure is slightly raised i.e. 140/90 mm Hg. There may be slight oedema of ankles and traces of albumin in the urine. In severe pregnancy hypertension the blood pressure is over 160/100 mm Hg. There is excessive oedema which extends to hands, faces and abdomen. Albuminuria is severe. The pregnancy induced hypertension i.e. toxemia is a combination of symptoms which include hypertension, odema of the face and hands and albuminuria usually after the 20th week of pregnancy (Campbell, D.M. 1996) [3]. It is suspected when there is sudden gain in weight indicating fluid retention rather than due to tissue building. The chances of women developing toxemia is increased many times in multiple pregnancies. Toxemia generally occurs in women who are overweight at conception and those who gain weight excessively during second and third trimester. The lower extremities are often hampered in the last months of pregnancy due increasing pressure of the expanding uterus on the inferior vena cava, obstructing the return of blood flow to the heart. Thus leading to decreased cardiac output, a fall in blood pressure, and lower-extremity edema. Mild physiologic lower extremity edema is associated with slightly larger babies and lower rate of prematurity.
Magnesium supplementation has been recommended to reduce leg cramps in pregnancy; however, it may not be effective for every pregnant woman. It is recommended to advise the patient to rest frequently. This will improve venous return and decrease edema. Elevation her feet and legs while sitting also helps to reduce the condition.

Anaemia: During pregnancy, there is slight lowering of the hemoglobin content as blood volume increases significantly leading to hemodilution.The red cell mass expands only 20 to 30% above normal and this occur more slowly. This leaves proportionately fewer RBCs in the pregnant woman's blood stream. The lower ratio of red blood cells is a condition known as physiological anaemia, since it is a normal response to pregnancy rather than the result of poor nutrient intake. The resulting fall in hemoglobin concentration may be about 2g/100 ml of blood.

Role of Nutrition on the Outcome of Pregnancy: A mother who been well nourished prior to conception enters pregnancy with a reserves of several nutrients that can meet needs of growing foetus without affecting her own health. The mother's diet during pregnancy has a direct influence on the foetal growth and development. The mothers eating inadequate food during this period give birth to low birth weight babies weighing less than 2,500 g. Large number of such babies are premature i.e. born before 37 weeks of gestation and the rest suffers from intrauterine growth retardation (IUGR). IUGR results in babies who are small for date (SFD) i.e infants who are born after 40 weeks of gestation but small because of malnutrition during intrauterine growth. The risk of low birth weight infants and the related neonatal mortality is increased when one or more of following risk exists during pregnancy: Low socioeconomic status & poor maternal nutritional status. The small stature of the mother, low pre-pregnancy weight for height, biological immaturity (17 years), low gain in weight during pregnancy, smoking, use of drugs, alcohol etc. The developing fetus may be unable to obtain optimal nutrients from a host who is compromised nutritionally. This have direct impact on structural or cognitive potential of child which may not be evident when an infant is born, but may manifest later in life. Women with poor nutritional status had adverse pregnancy outcomes with hemorrhage at delivery, prolonged labor, LBW infants, higher rates of spontaneous abortion, stillbirths, neonatal deaths, and congenital malformations inadequate diet during pregnancy also affects the health of the baby during early infancy. If infant survives, they develop nutritional diseases like anemia, rickets etc. or suffers from infectious diseases due to lack of resistance. Rapid cell proliferation occurs and the placenta begins to develop. Poor nutritional status of the mother can be one of the factors resulting in pregnancy failure at this stage (Antonov, A.N. 1947) [1].

Conclusion

Pregnancy is a physiologically and nutritionally a high demanding period. A woman prepares herself to meet the nutritional demands by increasing her own body fat deposits during pregnancy. If the nutrition of the mother is inadequate, then her body reserves are drawn upon and depleted to meet the nutrient demands of the growing fetus (Mohan, L.K. 2000) [4].

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