



Review Article

A mother's health during pregnancy

Fathima Feroz¹, Mahrukh Mehraj¹, R M Madhumitha Sri², S Ravichandran^{3,*}, Jyoti Rajput⁴

¹Dept. of Food Tech. and Nutrition, School of Agriculture, Lovely Professional University, Jalandhar, Punjab, India

²Dept. of Pharmaceutical Technology, Alagappa College of Technology, Anna University, Chennai, Tamil Nadu, India

³Dept. of Chemistry, Lovely Professional University and Chemistry, Jalandhar, Punjab, India

⁴Dept. of Physics, Lovely Professional University, Jalandhar, Punjab, India



ARTICLE INFO

Article history:

Received 02-01-2022

Accepted 12-01-2022

Available online 11-03-2022

Keywords:

Nutrition

Pregnancy

Birth defects

Mother's health

Mental health

ABSTRACT

A mother's health and nutrition status both before and during pregnancy have an important and significant effect on its baby's physical as well as mental health. Mothers health and dietary intake completely effects a baby's birth weight, rate of postnatal growth and chances of survival. If a mother is maintaining a good nutritious status with a healthy life style throughout her pregnancy, it optimizes maternal health and reduces the risk of pregnancy complication, birth defects and chronic diseases in her children and later in adulthood. This paper describes a woman with proper dietary intake, good nutritious status, and proper life style will have a healthy pregnancy which automatically increases the chances of having healthy delivery of baby, with very low complications. The baby has a better chance of having healthy life ahead.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Pregnancy is a stage in a women life which brings a huge and major change in her, physically as well as mentally. The symptoms of pregnancy vary from women to women and pregnancy¹⁻⁶ to pregnancy, however the most important and obvious symptom or indicator of pregnancy is missed periods or delayed menstrual cycle. Signs and symptoms of pregnancy can be experienced within a week of conception, or other women may experience their symptoms over a few weeks or may not develop any symptoms at all.

Some of the common pregnancy signs and symptoms are:

1. Getting a very light menstrual periods
2. Nausea
3. Tender or swollen breasts
4. Frequent urination

* Corresponding author.

E-mail address: ravichandran.23324@lpu.co.in (S. Ravichandran).



Fig. 1: Mother's health nutrition during pregnancy

5. Feeling tired
6. Mood swings
7. Feeling bloated

2. Parental Care

Prenatal care is simply care during pregnancy it is the most crucial period for a pregnant women, her family as well as for her health services provider as a pregnant women needs a lot of care during this period.^{7–13} It is important to keep both mother and baby healthy. Mothers who do not receive prenatal care are more risk at getting complications and their babies are more at risk of having low birth weight and the risk of dying is five times more than those of children receiving prenatal care. If a mother is getting prenatal care on a regular basis from health care providers then any health related issue and complication can be detected on early stages of pregnancy and can be further minimized. Prenatal care not only provides bodily care but also influences women to adopt good healthy eating habits, get emotional or mental counseling or support whenever needed, to get to know about local family services and prepare mother for child birth as well as being parents. Doctor, nurse, WIC nutritionist and others make a good health care team, which will monitor a women health, well being and life style properly. Regular tests, checkups, exams will be completed to check on the health of mother and baby. Women should ask her health care provider about possible changes she needs or might needs to encourage healthy pregnancy. And the team should collect that information they need to make any possible choices or changes.

3. Stages of Pregnancy

Counting from the first day of the last menstrual period a typical pregnancy lasts for 280 days or 40 weeks. The estimated date of confinement (EDC) of the infant is estimated from the LMP date. A health care provider will take sonogram and other measurements to get more accurate EDC. A full term infant is the one who is born at 38 to 40 weeks of gestation period. An average pregnancy lasts for about 40 weeks and is divided into three trimesters, in which each trimester is about 13-14 weeks or about 3 months.

4. Changes during Pregnancy

4.1. Breast changes

1. As women's body start to undergo many changes, there is an increase in number of milk glands as body starts to prepare milk.
2. There is a fat accumulation on breasts.
3. As the blood flow increases in the breast, bluish veins starts to appear on them.
4. The area around nipple and areola darkens. Areolas grow larger and nipple stick out more.
5. Montgomery's tubercles, small glands on the surface of the areola, become raised and bumpy. These glands produce an oily substance that keeps the nipples are soft.

Table 1: Fetal development by trimester

First trimester: 0-13 weeks

- Development of placenta
- Main organs of body are formed with nervous system
- Heart starts to beat
- Lung development
- Bone development
- Sense organs are developed (eyes, ears, nose, mouth), face, head, fingers, legs and toes
- Hair follicles starts to grow
- Buds for 20 temporary teeth develop.

Second trimester: 14-28 weeks

- The organs are further developed and starts to function
- Nails, eyebrows, and eyelashes are formed
- A wax coat is formed on the skin with formation of wrinkles
- Fine hair starts to cover body
- The fetus starts to move, sleep and wake
- Fetus starts to swallow, pass urine, sucks thumb and hear

Third trimester: 29-40 weeks

- Baby starts to stretch and kick
- Fetus gains its majority weight
- Bones harden while skull remains soft an flexible for delivery

During first three months of pregnancy breasts may continue to grow in size and weight, and first colostrums will appear in third month. It is a yellow thick nutrient full of nutrient and immune component-rich milk which breast produces for the baby during first few days of life. In some women there may be a slight drainage of colostrums from nipples. In the last trimester the breast continues to expand from the enlargement of milk-making cells and engorgement with colostrums.

4.2. Swelling

During pregnancy some women may have edema that is swelling in hands, face, legs, ankles, and/or feet. Edema is a condition of extra fluid in the body and it may be worsen in late pregnancy.

4.3. To relief swelling

1. Do not stand for long time.
2. Raise feet. Mother should try to sleep with legs propped up on pillows. This keeps fluid from building up in the lower half of the body.
3. Mother should exercise often and be physically active it helps to improve circulation, which reduces edema
4. Avoid garters, socks or stockings that constrict the leg.

4.4. Mouth and tooth changes

Due to pregnancy hormones gums may swell and bleed. Also gums and teeth become more prone to cavities and gum diseases. And to ensure mouth remains healthy a dental check up in early pregnancy is must. Avoiding dental

health can lead to further problems. It is important that during a dental check mother should aware dentist about her pregnancy.

4.5. Heartburn and indigestion

Heartburn and indigestion are not the same conditions. When stomach takes more time to digest food or to get empty then its normal time it is known as indigestion. The symptoms include:

Bloating, gas, feeling full etc. Burning feeling in throat and chest is known as heartburn. Muscle valve between the stomach and esophagus are relaxed by pregnancy hormones which mainly causes heartburn during pregnancy. When the valve does not close, stomach acids leak into the esophagus. As the baby grows it puts pressure on stomach and causes stomach acid to leak into esophagus.

To prevent indigestion and heartburn

1. Insisted of eating full big meals try to eat small meals frequently
2. Chew food properly and slowly
3. Limit liquids within meals
4. Do a proper movement for an hour after meal
5. Limit oily processed foods
6. Do not consume too much citrus fruits, juices, carbonated drink and caffeine
7. Do not eat or drink right before bed or have dinner till 8pmonly
8. Wear loose comfortable cloths.
9. Nausea and vomiting

Often called as morning sickness, nausea and vomiting are the most common problems during pregnancy. Although it occur at any time of the day. Most of the women face this issue only during first trimester while as some women may face this throughout there pregnancy. Morning sickness may be more severe when women is in her first pregnancy or multi-fetal pregnancies. Mild nausea and vomiting is not harmful for mother or baby and it does not mean that the baby is sick or there is any complication.

4.6. Tips to relieve morning sickness

1. Before getting out of bed in the morning, relax and sit on the side of the bed for few minutes and then get up slowly.
2. Try to get more fresh air
3. Insisted of eating full big meals try to eat small meals frequently
4. Do a proper movement for an hour at-least after meal
5. Avoid strong smells
6. Limit oily spicy processed foods instead eat low fat, easy to digest foods like :plain pasta, crackers, potatoes, rice, fruits and vegetables, lean meats, fish, poultry and eggs.

7. Drinking ginger ale or peppermint tea may help relieve these symptoms for some women.

5. Constipation and Gas

Constipation during gas has several reasons including:

1. Hormone changes: Digestive processes are slowed during pregnancy due to the increased level of hormone progesterone
2. Iron supplements: As it is prescribed to prevent anemia in pregnancy it makes constipation worse.
3. Changes in digestion: The colon absorbs more water during pregnancy so less water is available for stool formation.
4. At the end of pregnancy as baby is fully grown it puts more pressure on rectum due to which gas builds up in abdomen and cause bloating and pain.

Tips to manage constipation during pregnancy:

1. Drink plenty of water and fruit juices
2. Add more fiber in food
3. Do not skip meals
4. Do regular exercise and be physically active.

6. Hemorrhoids

Problem of constipation during pregnancy can lead to hemorrhoids, and it is a condition in which the blood vessels around anus get swollen. These vessels are already present but due to pressure they are stretched. This swelling is caused by two main reasons that is extra blood in the pelvic area and increased pressure due to the growing fetus in uterus. The straining during bowel movements caused by constipation can lead to swollen veins as more blood is being trapped in the veins. To relief this problem it is recommended to:

1. Have plenty of water, fruits and add a lot of fiber in every meal.
2. Do regular exercise and movement as standing and sitting for too long can put pressure on lower body
3. Excess weight can aggravate this conditions so it is recommended to keep parental weight gain with recommendations
4. If hemorrhoids have already developed the discomfort can be alleviated by soaking in a tub few times a day or by applying an ice pack to the problem area.

7. Parental Diet

Good nutrients is essential in the course of being pregnant. A pregnant women should consume good amount of vitamins and energy for her body functions and to help her growing fetus. A women's food plan in the course

Table 2: Fiber rich food

Fruits	Apple, kiwi, strawberries, raspberries, dried apricots, dried figs, prunes, raisins etc.
Vegetables	Cabbage, broccoli, cauliflower, carrot, beans, Brussels sprouts, corn, peas, potatoes, sweet potatoes, tomatoes, turnip greens etc
Bread	Whole wheat bread, oatmeal, whole wheat pasta, bran breads, cereals, shredded wheat, bran flakes etc.
Grains	Brown rice, whole grain, oat bran, cornmeal, barley, bulgur, wheat bran etc.
Others	Almonds, coconut, peanuts, nuts, hazelnuts etc.

of being pregnant can substantially have an effect on the final results of the being pregnant. When a pregnant lady eats, the vitamins absorbed through her blood movement to the placenta. The vitamins cross the placenta and are taken up via way of means of the blood stream of the fetus. The parental food plan have to encompass proteins, carbohydrates, vitamins, minerals and fats to fuel the body and assist the child develop. If the maternal food plan does now no longer contain proper amount of vitamins to satisfy the developing fetus needs, the mother will deliver some of the vitamins at her very own body expense. She might not produce a healthy placenta or make sufficient blood, inflicting her little one to develop extra slowly. Pregnant women should get proper fluid consumption to save from dehydration which can cause miscarriage or premature labor. Pregnant women want at the least 2 quarts (sixty four oz) of fluids each day. Water have to account for at the least 1/2 of the fluids consumed. The rest can come from milk, juice and different beverages.

Table 3:

Criteria for a Healthy Parental Diet
<ul style="list-style-type: none"> • Provides good enough energy for suitable weight gain • Well-balanced food in diet • Tastes properly and is fun to eat • Spaces ingesting at durations at some stage in the days • Provides good enough quantities of high fiber foods • Includes eight cups of fluid daily • Limits drinks that include caffeine (2-3 servings or fewer daily) • Has slight quantities of fat, saturated fat, cholesterol, sugar and sodium • Stable and continuous food supply • Excludes alcohol

8. Nutrient needs during pregnancy

All of the vitamins and minerals had to help a healthful pregnancy, besides for iron and folic acid may be acquired from a healthful diet. One manner to make certain that all nutrient desires are met is to comply with all important and essential vitamins and minerals they need. During

pregnancy good and proper amounts of certain important nutrients are needed to support the growth of fetus and cell differentiation.

Table 4:

S.No	Dietary Reference Intakes for Women		
1	Nutrient	Adult woman	Pregnancy
2	Energy (kcal)	2,403	2,743-2,855
3	Protein (g/kg/d)	0.8	1.1
4	Carbohydrate (g/d)	130	175
5	Total fiber (g/d)	25	28
6	Linoleic acid (g/d)	12	13
7	Vitamin C (mg)	75	85
8	Vitamin A (μ g)	700	770
9	Vitamin K (μ g)	90	90
10	Vitamin E (mg)	15	15
11	Vitamin B12 (μ g)	2.4	2.6
12	Vitamin B-6 (mg)	1.3	1.9
13	Riboflavin(mg)	1.1	1.4
14	Niacin (mg)	14	18
15	Thiamin (mg)	1.1	1.4
16	Biotin (μ g)	30	30
17	Pantothenic acid (mg)	5	6
18	Phosphorus (mg)	700	700
19	Calcium (mg)	1,000	1,000
20	Magnesium (mg)	320	350
21	Zinc (mg)	8	11
22	Folate (μ g)	400	600
23	Iron (mg)	18	27
24	Iodine (μ g)	150	220
25	Potassium (mg)	4,700	4,700

9. Calories

It is hard to specify particular energy necessities at some stage in pre-pregnancy because those range with pre-pregnancy weight, quantity and composition of weight gain, level of being pregnant and activity level. Most pregnant ladies will possibly need a general of 2200 to 2,900 kcal according to day. More studies is needed to establish calorie necessities for ladies carrying multiple fetus. Women, even overweight ladies, need t lower their calorie consumption at some stage in being pregnant. If energy desires aren't met, the protein the pregnant woman consumes may be used to satisfy her caloric necessities. If protein consumption is no longer adequate, the mother's muscle stores can be applied to offer needed calories. This is a probably risky state of situation because the protein used to satisfy energy necessities is then now no longer to be had for building new cells and tissues within side the mother and fetus.

10. Protein

Protein desires at some point of being pregnant are variable, increasing as being in pregnant progresses. The best demand

for protein takes place at some point of the second and third trimesters. Good protein encompass lean meats, poultry and fish. These sources additionally deliver other essential nutrients, consisting of iron, B vitamins, and some minerals. Other high-protein foods include dry beans, lentils, nuts, eggs and cheese.

11. Iron

The RDA for iron will increase from 18 mg in line with day to 27 mg in line with day during pregnancy. Iron is used to make hemoglobin, a protein in red blood cells that includes oxygen to all organs and tissues in addition to the baby. The fetus also gets sufficient iron to make use of within the first few months of life. Certain ingredients in food are accurate iron reassets, together with lean beef and pork, organ meats, dried fruit and beans, entire grains and darkish leafy greens. Vitamin C enhances iron absorption from plant reasserts while calcium can block iron absorption. For this motive calcium and iron must now no longer be taken together. A accurate practice is to take dietary supplements with iron within the morning and dietary supplements with calcium at night. Iron dietary supplements must be taken simplest with a fitness care provider's recommendation.

12. Calcium

The calcium advice all through being pregnant is 1,000 mg/day for women 19 to 50 years of age, and 1300 mg/day for teens. Calcium is very important during the course of being pregnant. It is an vital structural part of fetal bones and enamel and is essential for the bone fitness of the mom all through and after being pregnant. When a women does not get sufficient calcium from her diet, the body takes it from her bones. Over time, this loss may also weaken bone and cause osteoporosis, a disease characterized with the aid of using odd bone mineral density. In general, non-pregnant women eat best approximately seventy five percentage of the endorsed quantity of calcium consequently maximum pregnant women want to add calcium-wealthy meals to their diet. Calcium-fortified orange juice and meals, sardines, salmon with bones and collard, mustard, spinach, and turnip vegetables are correct reasserts of calcium from outside the dairy group.

13. Conclusion

Certain meals include chemical substances that could have an effect on the baby's development. The table underneath lists of food to be averted all through pregnancy. Some kinds of fish ought to be totally avoided absolutely all through pregnancy (swordfish, shark, king mackerel and tilefish), but twelve oz or much less in keeping with week of fish and shellfish decided to be low in mercury (shrimp, canned mild tuna, salmon, sardines and catfish) is safe. Albacore or "white" tuna ought to be limited to six ounces. or much less

Table 5: Important nutrients during pregnancy

Nutrient RDA	Importance	Best Sources
Folate 600 mcg	Helps make the neural tube which becomes your baby's spinal cord.	Citrus fruits and juices, dark green leafy Vegetables, Products like whole wheat breads and tortillas, flour, pasta, rice etc.
B Vitamins	Help your body release energy from the foods you eat.	Lean meats (pork, beef, poultry) and products like whole wheat breads and tortillas
Calcium 1000 mg	Helps your body regulate fluids, and it helps build your baby's bones and tooth buds.	Dairy foods (milk, cheese, yogurt), canned fish (salmon, sardines fortified orange juice, soy milk and tofu; leafy greens.
Iodine 220 mcg	Helps in the production of thyroid hormones. Infants born to mothers with severe iodine deficiency can have mental retardation and problems with growth, speech, and hearing.	Iodized salt, dairy foods (milk, cheese, yogurt), seaweed, shellfish, fish, meats, and eggs.
Vitamin C 85 mg	Helps with wound healing, tooth and bone development, and promotes metabolic processes.	Vegetables and fruits, such as broccoli, green and red peppers, collard greens, cauliflower, lemon etc.

in keeping with week as it has greater mercury than canned mild tuna.

1. Raw fish, especially shellfish.
2. Undercooked meat, poultry and seafood. Cook thoroughly to kill bacteria.
3. Refrigerated fresh pates or meat spreads. Canned versions are safe.
4. Refrigerated fresh smoked seafood unless it has been cooked (as in a casserole).Canned versions are safe.
5. Soft-scrambled eggs and all foods made with raw or lightly cooked eggs.
6. Soft cheeses made with unpasteurized milk, including Brie, Camembert,
7. Unpasteurized milk and any foods made from it.
8. Unpasteurized juices.

9. Raw vegetable sprouts, including alfalfa, clover and radish.
10. Herbal supplements and teas.



Fig. 2: Healthy mother

14. Conflict of Interest

None.

15. Source of Funding

None.

References


1. The American College of Obstetricians and Gynecologists. In: Your Pregnancy & Birth. Washington, DC: Meredith Books; 2005.
2. Position of the American Dietetic Association: Nutrition and Lifestyle for a Healthy Pregnancy Outcome. *J Am Diet Assoc.* 2008;108(3):553–61.
3. Eisenber A. What to Expect When You're Expecting. New York, NY: Workman Publishing Company, Inc; 1991.

4. Story M, Holt K, Sofka D. Bright Futures in Practice: Nutrition. Arlington, VA: National Center for Education in Maternal and Child Health; 2002.
5. Insel P, Turner RE, Ross D. Nutrition. Sudbury, Massachusetts: Jones and Bartlett Publishers; 2001.
6. Gabbe SG, Niebyl JR, Simpson JL, Landon MB, Galan HL, Jauniaux ERM, et al. Obstetrics: Normal and Problem Pregnancies. 7th ed. Philadelphia, PA: Elsevier; 2017.
7. Forbes LE, Graham JE, Berglund C, Bell RC. Dietary change during pregnancy and women's reasons for change. *Nutrients.* 2018;10(8):10–32.
8. Nada M, Dragan T, Bojana K. Nutritional analysis in women during pregnancy. *Res Rev DGTH.* 2015;44(2):183–93.
9. Jones CE, Calvert A, Doare KL. Vaccination in pregnancy-recent developments. *Pediatr Infect Dis J.* 2018;37(2):191–3.
10. Rezaeyan M, Morteza H, Khedri P, Mehrabi M. Effects of education on exercise (physical activity) performance of pregnant women. *Int J Med Res Health Sci.* 2016;5(12):142–6.
11. Neiger R. Long-term effects of pregnancy complications on maternal health: a review. *J Clin Med.* 2017;6(8):76.
12. Fahami F, Amini-Abchuyeh M, Aghaei A. The relationship between psychological wellbeing and body image in pregnant women. *Iran J Nurs Res.* 2018;23(3):167.
13. Motosko CC, Bieber AK, Pomeranz KJ, Stein JA, Martires KJ. Physiologic changes of pregnancy: A review of the literature. *Int J Women's Dermatol.* 2017;3(4):219–24.

Author biography

Mahrukh Mehraj, Student

R M Madhumitha Sri, Student

S Ravichandran, Associate Professor  <https://orcid.org/0000-0001-7281-2778>

Jyoti Rajput, Associate Professor

Cite this article: Feroz F, Mehraj M, Sri RMM, Ravichandran S, Rajput J. A mother's health during pregnancy. *Int J Clin Biochem Res* 2022;9(1):11-16.