

REVIEW ARTICLE

The Nutritional Needs of Mothers and Babies: A Review

Sanjana Joshi¹, Luxita Sharma^{1*}, Lokesh Barde², Manoj Tare³, Dwarkadas Baheti⁴,
Ganesh Dama⁵, Harshal Tare⁵

¹*Department of Dietetics and Applied Nutrition, Amity University, Gurgaon, Haryana, India.*

²*Department of Pharmaceutics, Jagdamba Education Society's S.N.D. College of Pharmacy, Yeola, Savitribai Phule Pune University, Pune, Maharashtra, India*

³*Department of Pharmaceutics, Sitabai Thite College of Pharmacy, Shirur, Savitribai Phule Pune University, Pune, Maharashtra, India.*

⁴*Department of Pharmacognosy, Sitabai Thite College of Pharmacy, Shirur, Savitribai Phule Pune University, Pune, Maharashtra, India.*

⁵*Department of Pharmacognosy, Sharadchandra Pawar College of Pharmacy, Otur, Savitribai Phule Pune University, Pune, Maharashtra, India.*

Received: 16th January, 2023; Revised: 13th March, 2023; Accepted: 10th May, 2023; Available Online: 25th June, 2023

ABSTRACT

The aim is to assess the importance of measuring healthy habits by pregnant women, that enhance different factors of mother and fetus health. We evaluate the change and variations in dietary recommendations. A female went through a lot of physical and mental changes in different stages of pregnancy and there are some common symptoms such as vomiting, fatigue, nausea, frequent urination, dizziness, etc. Certain hormonal changes are there to balance the body's fatigue, tiredness, and hormones, few dietary recommendations are mentioned and it has been concluded that diet plays an important role during pregnancy, and meeting all the nutrition needs is an essential factor in planning the diet. Many diseases/deficiencies are there such as goiter, iodine deficiency, folate deficiency, gestational diabetes mellitus, gestational weight gain, Neural tube defects, and much more. A detailed view is mentioned below in the following paper: On average, pregnancy lasts 40 to 42 weeks (Nine months). On average, weight gain for a pregnant woman is 12 to 14 kg, thus weight gain can lower the risk of complications during labor and also lower the risk of LBW (low birth weight). Low GWG increases the risk of having an LBW infant. The average weight of the baby should be 2.5–3 kg. A baby having this much body weight should be considered a healthy infant. We provide up-to-date advice for achieving optimal nutrition before conception, throughout breastfeeding, in the first two years of life, and for preschoolers, with an eye on long-term health benefits. These guidelines are intended to aid in the primary prevention of obesity and the non-communicable diseases it is linked to among economically privileged groups, such as European women and children. Medical professionals should be incentivized and educated to promote and advise patients on preconception nutrition, which includes enhancing adolescent nutrition and health. Women who are physically active, eat healthily, don't smoke, don't drink excessively, and have a good body mass index (BMI) have a higher chance of having a safe pregnancy. Women of childbearing age should have their consumption and status of specific micronutrients closely monitored, especially folate. Women at risk for insufficient dietary intake of certain micronutrients may benefit from taking dietary supplements containing iron, vitamin D, vitamin B12, iodine, and maybe others. Smoke and alcohol should be strictly eliminated from the diet. Yes, diet plays an important role during pregnancy but staying physically active is equally important for the mother and the baby to promote general health and well-being. Exercise and stretching can reduce the risk of excessive maternal weight gain or gestational weight gain (Obesity). A long walk can greatly help a pregnant woman after lunch or in the morning.

Key words: Pregnancy; women; Nutrition; Diet; gestational.

International Journal of Pharmaceutical Quality Assurance (2023); DOI: 10.25258/ijpqa.14.2.30

How to cite this article: Joshi S, Sharma L, Tare M, Baheti D, Dama G, Tare H. The Nutritional Needs of Mothers and Babies: A Review. International Journal of Pharmaceutical Quality Assurance. 2023;14(2):421-425.

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Pregnancy is a critical phase for a woman and throughout the journey, she goes through a lot, if we define pregnancy, then we could say that It is the period when the offspring start developing in the female body (womb/ uterus). On average pregnancy, the period lasts for 40-42 weeks (Nine months).

What happens in pregnancy; a fusion of male and female gametes causes pregnancy. And there are certain symptoms in a female body show that the female is pregnant, such as it starts when a woman misses her period or gets delayed.¹

- Nausea or vomiting.
- Minor blackout and fatigue.
- At that time frequent urination could be noticed in the female body.

A female went through a lot of physical and mental changes. And it is a very divine process also it takes a lot of consciousness, care, and effort to create a healthy baby and in this immense process food and diet play a very important role. Nutrition consumption of pregnant women should be tracked during the process and later also, during the process of lactation. So, first, we will focus on the physiological changes during pregnancy.

Feeling nauseous and vomiting, backache, headache, constipation, fatigue and feeling tired, heartburn, tender breast, increase in appetite, dizziness or feeling unwell, regular contractions, lower back pain, swelling on body parts such as the face, hands, feet, Rash and Itching, abdominal cramps, burning sensation and chills.¹

Sometimes the mother might feel like the baby is coming down or pushing down. And the vaginal discharge also increases. Points to be considered and follow to cope with these symptoms, take a rest, help pregnant women by helping her with her personal things and household stuff, give her healthy food such as fresh fruits and boiled/green leafy vegetables, Avoid wearing Tight-fitting clothes, always wear comfortable supportive clothes and shoes.

Give her an extra pillow to comfort the pregnant woman and always consult and visit the doctor for regular checkups.¹

Hormonal Changes

There are two main hormones in the female body estrogen and progesterone. We can call them Chief pregnancy hormones. A woman secretes more estrogen during pregnancy. Human chorionic gonadotropin hormone (HCG) is also known as a placental hormone. It is found in pregnant women's blood and urine. And it increases during the first trimester. It plays a specific role in vomiting and nausea. If we talk about estrogen, it helps the female to develop sexual traits. And it is found in ovaries/fallopian tubes. Estrogen is responsible for a healthy pregnancy of a woman. And if we talk about the hormone progesterone, it is made up of the ovaries and placenta. It is also responsible for the thickening of the uterine lining for the implantation of the egg in the uterus. Some gastrointestinal changes also happen in the female body during pregnancy. Due to the hormonal imbalance, pregnant women feel nauseous or feel like vomiting, muscle contraction, cramps, and constipation.

She may feel bloated also changes in body fluids during pregnancy: As I mentioned earlier, there are frequent hormonal changes that occur in the female body during the period of pregnancy, so, it leads to extra fluid buildup at that time, it helps the baby to grow and expand his/ her size as well as the uterus size. This starts after two months and increases in the third trimester. The women may experience swelling and puffiness.²

Stages of Pregnancy

The stages of pregnancies are fertilization, cleavage, implantation, and embryonic disc.

Fertilization is the process where male and female gamete fuse together and forms a zygote. Blastomere: This stage occurs just after fertilization and continues through the first week of embryo development. After the zygote is formed (approximately after 90 min.) Basically, the blastocyst comprises two different tissues: Trophoblast and Inner cell mass. After that, zona pellucida breaks and releases the blastocyst. After this, the process of implantation takes place in the uterus. Egg - Blastocyst - Embryo - Foetus. After the process of implantation, the placenta begins to develop. The embryo starts taking oxygen, and food (all the Nutrients) from the mother through the placenta and the Umbilical cord. This process continues and fetal development takes place. We can notice certain symptoms of successful implantation into the female body. Sore breasts, tiredness, dizziness, nausea, bloating, spotting and pigmentation, Vaginal discharge, Increased urination, Organogenesis the formation of body organs.³

Diet Planning During Pregnancy

Following a healthy and nutritious diet during pregnancy is interlinked with good brain development and healthy and happy birth of the baby. Also, Reduce the risk of birth complications and defects. Symptoms like anemia, fatigue, morning sickness, and other unpleasant pregnancy symptoms could be reduced and cured by a balanced diet.⁴

There are many recommendations that various nutritionists do during pregnancy. However, they vary according to the overall population's nutritional status and eating tradition. Various types of interventions are done by WHO (World Health Organization) to reduce the rate of gestational weight gain. Gestational weight gain (GWG) during pregnancy, healthy eating, and a physically active lifestyle is promoted.⁴

A balanced diet and adequate protein intake are essential for malnutrition and undernourished populations. As we have studied iron is an essential micronutrient so, iron deficiency can cause difficulties during pregnancy, iron, and folate and vitamin A supplements are recommended if needed. Pregnant women should avoid high consumption of caffeine. Also, smoking and alcohol should be restricted.⁴

Macronutrients

Proteins

The quality and Quantity of both compositions of protein are necessary for the diet. Many pieces of research show that

protein deficiency decreases birth weight, decreases bone weight, increases heart rate, and increases systolic blood pressure.⁴

As we all know, animal sources' protein quality is higher than plant sources. That's why it's so important to eat meat as your primary source of protein while you're expecting. Vegetarianism and veganism, especially when combined with certain types of plant-based diets, have been linked to microelement, mineral deficits, and negative pregnancy outcomes.⁵

Fats

Fat is important for a pregnant woman to eat because of the fatty acid makeup of her diet. Several books have taught us that omega-3 fatty acids help the brain and the retina develop and function optimally. Maternal serum DHA content is linked to neuronal fluidity and the production of a second messenger.⁶ DHA is a building block for a lipid mediator that suppresses inflammation (RVD), and this role is crucial.⁷ The health of the child is affected by the mother's diet, and a high-saturated-fat diet is linked to less effective asthma management during pregnancy.⁸

Carbohydrates

Carbs provide maximum energy to work and function and are an important element of a balanced and healthy diet.⁷ The inflammatory status associated with obesity in pregnant women could be impacted by more physical activity and less intake of carbohydrates. It has been seen in many pregnant women that modifying the carbohydrates/protein ratio can reduce the rate of gestational weight gain (GWG).⁸

Fiber

High fiber diet is essential in pregnancy as it reduces the chances of asthma and it also plays a main role in modulation of the gut microbiome. There is a model called the mouse model. A diet has shown that deferring and changing the amount of fiber and keeping the amount or ratio of fat, protein, carbohydrates, energy, and weight gain affect the development of allergic airway diseases(AAD). AAD is also known as a type of human asthma. Also, the high fiber correlates with fewer GP visits in the first year of life due to cold and cough.⁸

Micronutrients

There are many micronutrients that are vital for pregnant women such as zinc, iron, iodine, calcium, vitamin D, folate, etc. WHO has approved that multiple supplementations of micronutrients should be provided to a pregnant woman to reduce the risks of low birth weight (LBW) and small for gestational age (SGA).

- Folic acid prevents NTDs.
- Zinc is to prevent preterm birth.
- Iodine prevents cretinism.

Thus, supplementation with a wide range of micronutrients can prevent low birth weight and NTDs.⁹⁻¹² A vegan diet increases the risk of preeclampsia and faulty brain development due to insufficient DHA, iron, and zinc intake. Even though

vitamin D, folic acid, iodine, iron, vitamin B12, and zinc supplementation is crucial during pregnancy, studies suggest that a well-balanced vegetarian diet does not give good nutritional status. A pregnant woman's diet should include micronutrients such as vitamins A, D, E, folate, B12, B6, and C, as well as minerals like iron, zinc, iodine, copper, and selenium and B-complex vitamins like niacin, riboflavin, and thiamin to support metabolic processes.¹³

Role of Vitamins and Minerals

According to our research, micronutrients like vitamins and minerals have a significant effect on pregnant mothers and their babies as well.

Anaemia, brought on by an iron shortage, can result in death from hemorrhaging during labor and delivery.

A lack of iodine can lead to cretinism and premature birth.

Some difficulties in labor and delivery can be traced back to a lack of zinc. And fetal growth retardation, delayed neurobehavioral development, congenital anomalies, and immune system diseases.

Supplementation with vitamin A or carotene during pregnancy has been shown in a controlled experiment in Nepal to reduce maternal mortality by 50%, and other vitamin deficiencies, such as vitamin A or carotene deficiency, have also been linked to such issues. Cattle reproduction is negatively impacted by vitamin A deficiency. Recently, a function for -carotene, a precursor to vitamin A, in reproductive success has been hypothesized.¹⁴

The incidence of these inadequacies, the effects they have, and the most efficient public health strategies to remedy them are all areas that need further investigation.

Vitamin E and selenium supplements have been shown to decrease the rate of retained placenta, but they may have further impacts on fertility as well. Vitamin D, in addition to its role in calcium and phosphorus metabolism, may directly affect reproductive performance in cattle, which is negatively impacted by calcium and phosphorus shortages.

Folate, often known as vitamin B9, is one of the 13 important vitamins and minerals.

Folate must be obtained through diet or supplementation because the body cannot produce or synthesize it. Green leafy vegetables, egg yolk, legumes, and citrus fruits (oranges, lemons, guavas, etc.) are all good sources of folate.

Folic acid must first be lowered before it may play a role in cellular metabolism, as it is not metabolically active in its natural form. Altering levels of many other micronutrients in the diet can also affect fertility. Nutrient needs for optimal reproductive efficiency in contemporary dairy cow should be reevaluated carefully, however, the exact roles of nutrients in reproductive tissues are not well established.

The well-being of pregnant mothers and their unborn children. Fetal development and birth outcomes may be impacted by iron deficiency anemia, but this is not known to be the case. Evidence relating folic acid deficiency to various birth outcomes is inconsistent, however, it is known to cause

hematological issues, pregnancy difficulties, and congenital abnormalities. Some studies have found an association between zinc deficiency and birth defects, low birth weight, impaired fetal growth and development, and delays in the fetus's cognitive, behavioral, and immune systems. Iodine shortage during pregnancy leads to fetal loss, premature birth, and cretinism.¹⁵

Role of Probiotics During Pregnancy and Lactation

Probiotics have the potential to hold as the safest therapeutic tool to protect against complications during pregnancy and various outcomes regarding Maternal metabolism.

Few random controlled trial practices are immediately needed, particularly as it has high risks of metabolic disorders, e.g., gestational weight gain and weight gain.¹⁶

A number of studies analyzed previous research on randomized, double-blind, placebo-controlled trials. It found that taking probiotics throughout pregnancy reduced the risk of infant eczema. Some clinical practices have validated probiotic supplementation during pregnancy. Additionally, it may lessen the likelihood of developing atopic dermatitis in the first month of life.¹⁷⁻¹⁹

During Pregnancy A Female can Suffer from the Following Disease and Deficiency

Pregnancy-related goitre due to inadequate iodine intake

It is often held that iodine deficiency illnesses do not exist in Europe because many nations have had effective national programmes of dietary iodine supplementation in place for many years. Iodine intake varies widely across the country based on factors including latitude, altitude, and climate. Pregnant women often have a mild to moderate iodine deficit. Variations in iodine insufficiency may occur more frequently. Iodine supplements could be given to those who need them. A daily intake of less than 100µg increases the risk of iodine insufficiency. The recommended daily dosage for pregnant and breastfeeding women is 250 micrograms. Pregnant women are vulnerable to iodine shortage and goitre formation because of environmental and social factors that may cause anomalies in the thyroid gland's glandular machinery.²⁰

Neural tube defects (NTDs)

Prenatal folic acid supplementation has been proven to significantly lower the risk of neural tube defects in babies in a number of studies. Pregnant women can safely incorporate grain-based items like wheat, flour, pasta, etc. in their diets thanks to multivitamin supplements and fortification. During pregnancy, the recommended daily intake of folic acid is 600 micrograms, and while breastfeeding, the recommended daily intake drops to 500 µg, as recommended by the National Institutes of Health (NIH) and the Institute of Medicine (IOM).

It includes many deformities such as spina, bifida, and anencephalous. NTD symptoms may include physical problems such as paralysis, urinary control problems, deafness, bowel control problems, blindness, lack of consciousness, intellectual disabilities, obesity, and gestational weight of pregnancy. A high body temperature in the early stage of pregnancy.

Gestational diabetes mellitus

Instead of being taken in by the cells, the glucose builds up in the circulation. Gestational diabetes mellitus, also known as GDM, is quite common and occurs when the placenta's hormone prevents the body from responding to insulin. It is caused when the pregnant female body can't produce enough insulin and can't maintain the blood sugar levels. Some warning signs are fatigue, nausea, vaginal infection, sugar in the urine, lack of vision, skin infection, etc.

And the treatment for GDM would be: some specific dietary recommendations, a regular visit to the gynecologist, and sometimes blood medication is required as the blood sugar levels are high.¹⁶⁻¹⁹

Due to the Risk of Complications, Pregnancy and Lactation Call for Avoidance of Following Food

Caffeine

Caffeine buildup has a significant impact until consumption is reduced. Severe negative effects from caffeine use can occur at levels that are high but not deemed excessive on average days and in average situations. Large amounts of coffee during pregnancy are associated with a low birth weight baby. Several of the symptoms of caffeine toxicity are non-specific, making it difficult for pregnant women to pinpoint the source of their discomfort if their doctor does not inform them about their increased vulnerability to caffeine.²⁰

Alcohol

The placenta is the pathway for alcohol to reach the fetus during pregnancy. The liver is one of the last organs to develop and fully form in a developing newborn. Babies are unable to metabolize alcohol at the same rate as adults, and prolonged exposure to it can have devastating effects on their growth and development.

Tobacco use

Prenatal nicotine exposure has been linked to a variety of negative outcomes, including cleft lip and palate, low birth weight, and developmental delays in the infant. Smoking may increase the risk of having a miscarriage, according to research.

Foods high in fat and sugar

Pregnancy difficulties may be exacerbated by a diet high in junk food. Exhaustion, heartburn, stretch marks, diabetes in pregnancy, and other pregnancy-related symptoms may be exacerbated.²¹⁻²³

CONCLUSION

This review has concluded that a healthy and balanced diet is essential for healthy living, throughout life, so during pregnancy. We need to ensure that the pregnant woman or the lactating mother is getting sufficient nutrients and energy to function and meet her usual requirements. In addition, she is responsible for the offspring's development and growth at the time of lactation. A pregnant woman's dietary recommendations are similar and can be easily followed in daily routine. It has few notable exceptions. There are very

few things that we need to keep in mind that she meets her macronutrients and micronutrients daily requirements.

We need to assure them that she should not suffer from any deficiency and must not be lacking anything, such as iodine, zinc, folate, etc. On average, weight gain for a pregnant woman is 12 to 14 kg. Thus, weight gain can lower the risk of complications during labor and also lower the risk of LBW. Low GWG increases the risk of having an LBW infant. The average weight of the baby should be 2.5–3 kg. A baby having this much body weight should be considered a healthy infant. Various food safety issues apply to a woman before and during pregnancy. Some food hygiene methods need to be followed during that time. Vegan and vegetarian pregnant women need to consume fortified foods/ grains and other supplements. Yes, diet plays an important role during pregnancy but staying physically active is equally important for the mother and the baby to promote general health and well-being. Exercise and stretching can reduce the risk of excessive maternal weight gain or gestational weight gain (obesity). A long walk can greatly help a pregnant woman after lunch or in the morning. It is recommended that usual household stuff and daily practices could help in keeping pregnant women physically active. Dance and swimming can also help, according to her comfort. Through these practices, she would be able to deliver a normal and healthy baby without any complications.

REFERENCES

1. Koletzko B, Godfrey KM, Poston L, Szajewska H, Van Goudoever JB, De Waard M, Brands B, Grivell RM, Deussen AR, Dodd JM, Patro-Golab B. Nutrition during pregnancy, lactation and early childhood and its implications for maternal and long-term child health: the early nutrition project recommendations. *Annals of Nutrition and Metabolism*. 2019;74(2):93-106.
2. King JC. Physiology of pregnancy and nutrient metabolism. *The American journal of clinical nutrition*. 2000 May 1;71(5):1218S-25S.
3. Beckhaus AA, Garcia-Marcos L, Forno E, Pacheco-Gonzalez RM, Celedón JC, Castro-Rodriguez JA. Maternal nutrition during pregnancy and risk of asthma, wheeze, and atopic diseases during childhood: a systematic review and meta-analysis. *Allergy*. 2015 Dec;70(12):1588-604.
4. Baïz N, Just J, Chastang J, Forhan A, de Lauzon-Guillain B, Magnier AM, Annesi-Maesano I, EDEN Mother-Child Cohort Study Group. Maternal diet before and during pregnancy and risk of asthma and allergic rhinitis in children. *Allergy, Asthma and Clinical Immunology*. 2019 Dec;15:1-0.
5. Saldana TM, Siega-Riz AM, Adair LS. Effect of macronutrient intake on the development of glucose intolerance during pregnancy. *The American journal of clinical nutrition*. 2004 Mar 1;79(3):479-86.
6. Crume TL, Brinton JT, Shapiro A, Kaar J, Glueck DH, Siega-Riz AM, Dabelea D. Maternal dietary intake during pregnancy and offspring body composition: The Healthy Start Study. *American journal of obstetrics and gynecology*. 2016 Nov 1;215(5):609-e1.
7. Frias AE, Grove KL. Obesity: a transgenerational problem linked to nutrition during pregnancy. In *Seminars in reproductive medicine* 2012 Dec (Vol. 30, No. 06, pp. 472-478). Thieme Medical Publishers.
8. Wada L, King JC. Trace element nutrition during pregnancy. *Clinical obstetrics and gynecology*. 1994 Sep 1;37(3):574-86.
9. Glinoeer D. The importance of iodine nutrition during pregnancy. *Public health nutrition*. 2007 Dec;10(12A):1542-6.
10. Greenberg JA, Bell SJ, Guan Y, Yu YH. Folic acid supplementation and pregnancy: more than just neural tube defect prevention. *Reviews in Obstetrics and Gynecology*. 2011;4(2):52.
11. Geisel J. Folic acid and neural tube defects in pregnancy: a review. *The Journal of perinatal and neonatal nursing*. 2003 Oct 1;17(4):268-79.
12. Worthington BS. Nutrition during pregnancy, lactation, and oral contraception. *Nursing Clinics of North America*. 1979 Jun 1;14(2):269-83.
13. Cetin I, Böhling K, Demir C, Kortam A, Prescott SL, Yamashiro Y, Yarmolinskaya M, Koletzko B. Impact of micronutrient status during pregnancy on early nutrition programming. *Annals of Nutrition and Metabolism*. 2019;74(4):269-78.
14. Knutti R, Rothweiler H, Schlatter C. The effect of pregnancy on the pharmacokinetics of caffeine. In *New Toxicology for Old: A Critique of Accepted Requirements and Methodology 1982* (pp. 187-192). Springer Berlin Heidelberg.
15. Lim CE, Yii MF, Cheng NC, Kwan YK. The role of micronutrients in pregnancy. *Australian Journal of General Practice*. 2009 Dec 1;38(12):980.
16. Kjos SL, Buchanan TA. Gestational diabetes mellitus. *New England journal of medicine*. 1999 Dec 2;341(23):1749-56.
17. Lindsay KL, Walsh CA, Brennan L, McAuliffe FM. Probiotics in pregnancy and maternal outcomes: a systematic review. *The Journal of Maternal-Fetal and Neonatal Medicine*. 2013 May 1;26(8):772-8.
18. Seshadri RJ. American diabetes association gestational diabetes mellitus. *Diabetes Care*. 2002;25:S94-6.
19. Moosavi SE, Koushkie Jahromi M, Salesi M, Namavar Jahromi B. Relationship between exercise during and before pregnancy periods and gestational diabetes mellitus. *Journal of Gorgan University of Medical Sciences*. 2016 Sep 10;18(3):79-85.
20. Doege K, Grajecki D, Zyriax BC, Detinkina E, Zu Eulenburg C, Buhling KJ. Impact of maternal supplementation with probiotics during pregnancy on atopic eczema in childhood—a meta-analysis. *British journal of nutrition*. 2012 Jan;107(1):1-6.
21. Hinds TS, West WL, Knight EM, Harland BF. The effect of caffeine on pregnancy outcome variables. *Nutrition reviews*. 1996 Jul 1;54(7):203-7.
22. Black RE. Micronutrients in pregnancy. *British Journal of Nutrition*. 2001 May;85(S2):S193-7.
23. Hurley WL, Doane RM. Recent developments in the roles of vitamins and minerals in reproduction. *Journal of Dairy Science*. 1989 Mar 1;72(3):784-804.