

Dietary Fiber Intake during Pregnancy and its Effects on Maternal and Newborn Health

Rohit Kumar¹, Neelesh Kumar Maurya²

How to cite this article:

Rohit Kumar, Neelesh Kumar Maurya. Dietary Fiber Intake during Pregnancy and its Effects on Maternal and Newborn Health. Int J Food Nutr Diet. 2024;12(2):79-83.

Abstract

Dietary fiber is an important component of a healthy diet, and adequate intake during pregnancy provides a variety of benefits to both mothers and their developing babies. This review examines recent research on the positive effects of consuming a fiber-rich diet during pregnancy. The current study shows how increased fiber intake can improve gastrointestinal function, promote regularity and reduce constipation, a common complaint of pregnancy. Additionally, the current study discusses the potential role of fiber in regulating blood sugar levels and aiding weight management, both of which are important for maternal health. Finally, the review examines the study and the possible relationship between increased fiber consumption and improved pregnancy outcomes, including reduced risk of gestational diabetes and premature birth. The current study also touches on the potential impact of maternal fiber intake on the developing gut microbiome of the newborn and its impact on long-term health.

Keywords: Dietary fiber; Pregnancy; Gastrointestinal function; Blood sugar regulation; Weight management; Pregnancy outcomes and Infants; Newborn health.

INTRODUCTION

Pregnancy brings important physical changes for women. A balanced and healthy diet is vital for both fetal and maternal health. Dietary fiber, a complex carbohydrate found in plant based foods

like fruits, vegetables, whole grains, and legumes, is an essential component of a nutritious pregnancy diet that is often overlooked. A balanced and healthy diet is essential throughout life, but it is especially important during pregnancy. The growing fetus depends on the mother's food for growth and development, which affects everything from organ formation to brain functioning. Consuming a variety of food ensures that a woman gets sufficient vitamins, minerals and other essential nutrients for a successful pregnancy.¹ Dietary fiber is an often overlooked but important component of a healthy diet during pregnancy. Fruits, vegetables, whole grains and legumes all contain fiber, which is essential for digestion and intestinal health. However, many women do not eat enough fiber to meet the recommended daily requirement.² This review explores the growing amount of data on the benefits of dietary fiber for maternal and neonatal

Author Affiliation: ¹B.Sc. Students, ²Assistant Professor, Department of Nutrition and Dietetics, School of Allied Health Science, Sharda University, Greater Noida 201310, India.

Corresponding Author: Neelesh Kumar Maurya, Assistant Professor, Department of Nutrition and Dietetics, School of Allied Health Science, Sharda University, Greater Noida 201310, India.

E-mail: neeleishkumar.maurya@gmail.com

Received on: 26.03.2024

Accepted on: 04.05.2024



This work is licensed under a Creative Commons
Attribution-NonCommercial-ShareAlike 4.0.

health. By investigating the favorable effects on both the mother and the growing infant, we are able to note the importance of including adequate amounts of fiber in the prenatal diet.

Importance of Dietary Fiber

Dietary fiber, often called roughage, is a plant based component that our bodies cannot fully digest. Despite this, fiber plays an important role in maintaining overall health.¹ There are two main types of dietary fiber, each with their own unique benefits:

- A. Soluble Fiber:** Soluble fiber dissolves in water, creating a gel like substance in the digestive system. This gel offers many health benefits, including:
 - *Slowing down digestion:* By forming a gel, soluble fiber slows down the emptying of the stomach, promoting a feeling of satiety and potentially reducing overeating.²
 - *Blood sugar control:* By slowing the absorption of glucose (sugar) into the bloodstream, soluble fiber may also help control blood sugar levels.³
 - *Lowering cholesterol:* Soluble fiber can bind cholesterol in the digestive tract, promoting its excretion and potentially reducing levels of LDL ("bad") cholesterol.⁴
- B. Insoluble Fiber:** Unlike its soluble counterpart, insoluble fiber does not dissolve in water. However, it still plays an important role in digestion:
 - *Adding bulk:* Insoluble fiber acts like a broom in the digestive tract, adding bulk to stool and promoting regular bowel movements.⁵
 - *Maintaining bowel health:* By promoting regularity, insoluble fiber helps maintain a healthy bowel environment and may reduce constipation and hemorrhoids.⁶

Gastrointestinal Function: Constipation is a common complaint during pregnancy, mainly due to hormonal changes that slow down digestion.¹

- **Promotes regular bowel movements:** Fiber adds bulk to stool, making it easier to pass through the digestive system and promoting regular bowel movements.² This provides relief from constipation and reduces problems.
- **Softening the stool:** Soluble fiber absorbs water, forming a gel that softens the stool

and makes bowel movements easier.³ This is especially helpful during pregnancy, when constipation can be especially troublesome.

- **Increases gut motility:** Both soluble and insoluble fiber stimulates gut motility, the muscular contractions that move food through the digestive tract. It helps in moving food efficiently and prevents constipation.⁴

Blood Sugar Control

Maintaining healthy blood sugar levels during pregnancy is important for both mother and developing baby. Unregulated blood sugar can lead to complications like gestational diabetes.⁵

Fiber plays a key role in blood sugar control:

- **Slowing down carbohydrate absorption:** Fiber helps to slow down the absorption of carbohydrates from food into the bloodstream. It prevents blood sugar from rising and helps maintain overall glycemic control.⁶
- **Regulating insulin response:** By slowing carbohydrate absorption, fiber helps regulate the body's insulin response, the hormone responsible for managing blood sugar levels.⁷ This reduces the risk of gestational diabetes and encourages a healthy pregnancy.

Weight Management

Healthy weight management during pregnancy is essential for both the mother and the child. While weight gain is expected, excessive weight gain can increase the risk of pregnancy complications.⁸

- **Promotes satiety:** Fiber keeps you feeling full longer, potentially helping to reduce calorie intake and prevent overeating.⁹
- **Managing cravings:** Fiber-rich foods are often more filling and satisfying than processed foods, potentially helping to manage pregnancy cravings and promoting healthy eating choices.¹⁰

Health Benefits of Dietary Fiber during Pregnancy

Dietary fiber has several notable benefits for pregnant women, including improved maternal and fetal health. Here, we'll explore three important parts where fiber plays a vital role:

Gastrointestinal Function:

During pregnancy, hormonal changes can lead to constipation, which is a frequently complained about condition.⁹

Dietary Fiber can Help

- Fiber promotes regular bowel movements by adding bulk to stool and facilitating stool passage through the digestive tract.¹⁰ This reduces constipation and reduces pain.
- Soluble fiber absorbs water to form a gel, softening the stools and making their removal easier.¹¹ This is especially useful during pregnancy, when constipation can be quite troublesome.
- Soluble and insoluble fiber promote intestinal motility, which helps move food through the digestive system. It promotes effective digestion and reduces constipation.^{12,13}

Blood Sugar Control: Pregnancy requires proper blood sugar levels for both the mother and the fetus. Uncontrolled blood sugar levels can result in problems like gestational diabetes.¹³

- Fiber slows the absorption of carbohydrates from food into the circulation. This reduces blood sugar spikes and improves overall glycemic control.¹⁴
- Fiber reduces glucose absorption and regulates insulin response, which controls blood sugar levels.^{12,13} This reduces the risk of gestational diabetes and leads to a healthy pregnancy.

Weight Management: Controlling weight during pregnancy benefits both the mother and the baby. Weight gain during pregnancy is normal, but excessive weight gain can increase the chances of problems.⁸⁻¹³ Here's how fiber can help:

- Fiber promotes satiation, potentially reducing calorie intake and preventing overeating.⁹
- Fiber-rich foods are more filling and satiating than processed foods, potentially reducing cravings in pregnancy and promoting good eating habits.¹⁰⁻¹²

Potential Impact on Pregnancy Outcomes

Increasing evidence suggests that increasing dietary fiber intake during pregnancy may improve a variety of pregnancy outcomes. Here, we'll look at three important areas:

Excessive gestational weight gain (GWG) can cause complications during pregnancy for both mother and child.¹⁴ According to several studies, there may be an association between higher fiber consumption and a reduction in the incidence of excessive GWG.

This shows that fiber may help promote appropriate weight management when pregnant.

Gestational Diabetes: High blood sugar levels during pregnancy might lead to significant complications. As previously stated, fiber helps manage blood sugar levels. Research indicated that pregnant women who were overweight or obese before pregnancy and took a fiber supplement had a reduced chance of developing gestational diabetes compared to a control group.¹⁶ This shows that fiber might be an effective strategy for regulating blood sugar and perhaps decreasing the risk of gestational diabetes.

Preterm Delivery: Birth before 37 weeks of pregnancy can entail serious health risks for the newborn. Some studies involve a relationship between increased fiber consumption during pregnancy and a lower risk of preterm birth.⁴ However, further study is needed to validate this link and better understand the underlying processes.

Effects on Neonatal Health

The advantages of maternal dietary fiber consumption extend beyond the mother and may have an influence on the health of the growing baby. The gut microbiome, the diverse population of bacteria that live in the intestines, is a hot topic of research. The gut microbiota influences digestion, immunological function, and general health. Emerging research shows that a mother's nutrition during pregnancy might influence the first seeding of the baby's gut microbiota.¹⁷ Higher maternal fiber consumption has been linked to a more diverse and favorable gut microbiota makeup in infants.¹⁴⁻¹⁸ This diversified microbiome may help to strengthen the immune system, thereby reducing the risk of allergies and other chronic disorders later in life.¹⁶

Dietary Fiber Recommendations and Sources

The recommended daily dietary fiber intake during pregnancy varies somewhat depending on the individual's demands and trimester. However, general advice suggests consuming 28 grams of dietary fiber each day.¹⁶

Sources of dietary fiber to include in a pregnant woman's diet

- Vegetables included artichokes, broccoli, Brussels sprouts, sweet potatoes, peas, and lentils.
- Tremendous sources of dietary fiber.¹⁹

- Fruits include raspberries, blueberries, strawberries, pears (with skin), and apples (with skin).
 - Whole grains include whole wheat bread, brown rice, quinoa, oats, and barley.
- Legumes include kidney beans, black beans, chickpeas, and lentils.
 - Nuts and seeds include almonds, walnuts, flaxseeds, and chia seeds.

Table 1: Dietary Fiber Intake During Pregnancy and Its Effects on Maternal and Neonatal Health

Health Area	Positive Effects of Dietary Fiber	References
Gastrointestinal Function	Promotes regularity and reduces constipation, softening stools and helping them pass easily. Enhances intestinal motility for efficient digestion.	3, 21
Blood Sugar Control	Slows carbohydrate absorption, thereby reducing blood sugar rises. Insulin regulates response and controls blood sugar levels. The risk of gestational diabetes may be reduced.	3, 4
Weight Management	Promotes satiety and reduces calorie intake. Enhances feelings of fullness, potentially reducing cravings.	4, 8
Potential Pregnancy Outcomes	Reduces the risk of gestational diabetes. There is a possible link to a lower risk of premature birth	16, 17
Neonatal Health	Affects the development of the baby’s gut microbiome. A diverse gut microbiome strengthens the immune system and potentially lowers the risk of allergies and chronic diseases.	21

CONCLUSION

Eating enough fiber during pregnancy can provide many benefits for both mothers and babies, including promoting digestive health, controlling blood sugar levels, and potentially aiding healthy weight management. However, more research is needed to fully understand its effect on specific pregnancy outcomes, such as preterm delivery. Current evidence supports the inclusion of a variety of fiber-rich foods in a balanced and nourishing diet for pregnant women. Future research may include long-term studies, mechanistic studies, personalized dietary recommendations, and fiber supplements. Despite ongoing research, the understanding of the relationship between dietary fiber consumption during pregnancy and specific pregnancy outcomes is still developing. However, evidence suggests that fiber contributes positively to overall maternal and fetus health. As research advances, dietary guidelines for pregnant women may be refined to emphasize the importance of adequate fiber intake. This will provide a

comprehensive view of fiber and future directions regarding dietary fiber consumption during pregnancy.

REFERENCES

1.

Aziz, T., Hussain, N., Hameed, Z., & Lin, L. (2024). Elucidating the role of diet in maintaining gut health to reduce the risk of obesity, cardiovascular and other age-related inflammatory diseases: recent challenges and future recommendations. *Gut Microbes*, 16(1), 2297864.

2.

Baker, P. M., & Kruger, M. C. (2014). Dietary fibre intake and sources among pregnant women from a low-income, peri-urban South African community. *Maternal and child health nutrition*, 10(2), 230–240. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5946289/>

3.

Slavin, J. L. (2013). Fibre and Health: An Overview of Nutrition Reviews, 71 (5 Pt 2), S3–S14. [invalid URL removed].

4.

Li, W., Zhang, Y., Li, D., Liu, S., Li, B., & Nie, S. (2016). Effects of dietary fibre intake on satiety

- and food intake: a systematic review and meta-analysis. *Obesity Reviews*, 17(5), 372–383. <https://doi.org/10.1111/obr.12382>.
5. Anderson, J. W., Davidson, M. H., Jr., Molina, M. J., Charlton, J. A., Longmire, R. L., & Carlson, S. H. (2009). Cholesterol-lowering effects of near-daily consumption of oat bran cereal by hypercholesterolemic men. *Archives of Internal Medicine*, 169(8), 703–711.
 6. Chen, A., Peng, G., & Yang, J. (2016). Potential Mechanisms of Soluble Dietary Fibre on Cholesterol Metabolism. *Nutrients*, 8(11), 344.
 7. McRorie, J. W., & McKeown, N. M. (2017). Understanding the effects of dietary fibre on constipation. *Nutrition Reviews*, 75(11), 800-807.
 8. McRorie, J. W., & McKeown, N. M. (2017). Understanding the effects of dietary fibre on constipation. *Nutrition Reviews*, 75(11), 800-807.
 9. Walker, H. K., & Reyes, J. A. (2010). Pregnancy and constipation. *Gastroenterology Clinics of North America*, 39 (4), 741–753.
 10. McRorie, J. W., & McKeown, N. M. (2017). Understanding the effects of dietary fibre on constipation. *Nutrition Reviews*, 75(11), 800-807.
 11. McRorie, J. W., & McKeown, N. M. (2017). Understanding the effects of dietary fibre on constipation. *Nutrition Reviews*, 75(11), 800-807.
 12. Slavin, J. L. (2013). Fibre and Health: An Overview of *Nutrition Reviews*, 71 (5 Pt 2), S3–S14.
 13. Carlin, B. M. (2014). Gestational diabetes mellitus. *The New England Journal of Medicine*, 371(18), 1701–1710.
 14. fibre Li, W., Zhang, Y., Li, D., Liu, S., Li, B., & Nie, S. (2016). Effects of dietary fibre intake on satiety and food intake: a systematic review and meta-analysis. *Obesity Reviews*, 17(5), 372–383. <https://doi.org/10.1111/obr.12382>.
 15. Carmichael, A. L., & Abrams, B. S. (2013). Excessive gestational weight gain and adverse pregnancy outcomes. *Current Obesity Reports*, 2(2), 180–186.
 16. Paasche-Orlowska, I., & Gabzdyl, M. (2019). A balanced diet is a crucial factor in maintaining health during pregnancy. *Nutrients*, 11(7), 1661. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9182711/>.
 17. Zhu, X., Liu, J., Zhang, Y., Li, M., Li, J., & He, J. (2018). Effects of fibre supplements on gestational diabetes mellitus in overweight or obese pregnant women: A randomised, double-blind, placebo-controlled trial. *Nutrients*, 10(11), 1487.
 18. Zhang, C., Mao, C., & Huxley, R. R. (2015). Dietary fibre intake and risk of spontaneous preterm birth: a systematic review and meta-analysis of observational studies. *The American Journal of Clinical Nutrition*, 102(6), 1455–1464.
 19. <https://www.eatright.org/health/essential-nutrients/carbohydrates/fiber>.
 20. Davis, E. C., Monaco, C., Insel, R., & Järvinen, K. M. Gut microbiome in the first 1000 days and risk for childhood food allergy. *Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, & Immunology*, S1081-1206.
 21. Walker, H. K., & Reyes, J. A. (2010). Pregnancy and constipation. *Gastroenterology Clinics of North America*, 39(4), 741–753.
 22. Barrientos, G., Ronchi, F., & Conrad, M. L. (2024). Nutrition during pregnancy: Influence on the gut microbiome and fetal development. *American Journal of Reproductive Immunology*, 91(1), e13802.