Advances in Bioresearch
Adv. Biores., Vol 16 (1) January 2025: 170-174

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.16.1.170174

Advances in Bioresearch

REVIEW ARTICLE

Millet and Maternal Health: A Systematic Review of Ayurvedic Recommendations and Scientific Evidences of millet-based diet for Pregnant and Lactating Women.

Prachi G. Dabhi*[1] & Vaidehi V. Raole[2]
[1,2] Department of Kriyasharir, Parul Institute of Ayurveda, Vadodara; India
Corresponding author's Email: drprachidabhi3@gmail.com; vaidehi.raole@paruluniversity.ac.in

ABSTRACT
Pregnancy significantly elevates the demand for essential nutrients to support fetal growth and development, accompanied by alterations in weight, plasma, and blood volume. Common health issues among pregnant women, such as anemia, gestational diabetes, and hypertensive disorders, often arise from inadequate dietary intake, unhealthy lifestyle choices, and stress. Ayurveda posits that a pregnant woman's diet serves as both her primary source of nutrition and a form of medicine. Classical Ayurvedic texts reference millets, particularly Ragi and Shyamaka, in the context of Garbhini and Sutika Paricharya, which pertain to antenatal and postnatal care. A comprehensive review of available literature supports these findings. During the first trimester, it is crucial for expectant mothers to consume foods abundant in folic acid and vitamins, while the second trimester emphasizes the importance of fiber-rich foods. Millets are particularly beneficial as they are high in protein, antioxidants, dietary fiber, magnesium, potassium, calcium, iron, and folate. The presence of calcium and folate is vital for the healthy development of bones and nerve cells, while magnesium and potassium help regulate blood pressure and may prevent premature labor. Additionally, millets are an excellent source of iron, which enhances hemoglobin production and are gluten-free, making them suitable for pregnant women with celiac disease or gluten sensitivity. Throughout pregnancy, millets serve as a versatile and nutritious food option, effectively meeting the varying dietary needs of each trimester. This paper aims to provide a comprehensive overview of a millet-based diet during pregnancy, which can be tailored to the individual's age, seasonal variations, geographical location, constitution, and digestive capacity, thereby affirming traditional knowledge regarding the use of millets among young mothers.
***Keywords**: Millets, Maternal health, Garbha Sanskara,*

Received 14.10.2024 Revised 19.12.2024 Accepted 23.01.2025

How to cite this article:
Prachi G. Dabhi and Vaidehi V. Raole. Millet and Maternal Health: A Systematic Review of Ayurvedic Recommendations and Scientific Evidences of millet-based diet for Pregnant and Lactating Women. Adv. Biores. Vol 16 [1] January 2025. 170-174

INTRODUCTION

In the Vedic tradition, motherhood is revered as a sacred and essential role, imbued with profound respect, responsibility, and spiritual significance. Ayurveda, a holistic system of medicine rooted in Vedic wisdom, extends this reverence to the physical, mental, and spiritual well-being of both mother and child. It emphasizes the interconnection of health, lifestyle, and ethical conduct in nurturing the next generation. Some key Ayurvedic insights for mothers include:

1. *Garbha Sanskara (गर्भ संस्कार)*
2. *Garbhini Ahara, Vihar and Achara*- Antinatal and perinatal care
3. *Sutika Paricharya*- Postpartum Care
4. Breastfeeding and Nutrition
5. Emotional and Spiritual Nurturing
6. Herbal Support

Aahara (diet and nutrition), *Vihara* (lifestyle practices), and *Aachara* (conduct and behavior) form the foundation of Ayurvedic recommendations for maintaining optimal health and well-being during pregnancy, childbirth, and postpartum. These principles emphasize holistic care, considering not only

physical health but also psychological and aspects to support the mother in nurturing a healthy and balanced environment for herself and her child [1]. Ayurveda prioritizes three key objectives in maternal care: *Paripurnatva*: Ensuring the healthy growth and development of both the fetus and mother.; *Sukhaprasava*: Promoting a smooth and uncomplicated delivery; *Anupghata*: Preventing complications during pregnancy. The care of pregnancy mainly involves: *Masanumasika Pathya*: Tailoring dietary regimens to each month of pregnancy; *Garbhopaghathakara Bhavas:* Identifying and avoiding substances or activities that could harm the fetus; *Garbhasthapaka Dravyas:* Incorporating substances beneficial for fetal development. *Charaka has* provided good advice regarding the nourishment of Pregnant women and foetus Whatever the pregnant mother consumes, and is able to digest, that nourishes the fetus inside her. The 'आहार रस' (~Ahar rasa) of the expecting mother must fulfil three important functions – It should nourish the mother's body properly. It should help improve both quality and quantity of breast milk. It should help to nourish and develop the embryo. So, a lack of any of the essential nutrients will result in deficiency in the foetus. This could retard its development and may have extreme consequences like a sudden miscarriage, premature delivery, low birth weight or a weak constitution(~*Prakriti*). Therefore, a correctly planned diet will contribute towards preventing these problems. *Masanumasika Pathya* includes the schedule of Month wise beneficial food articles and dietary recommendations. Some of millet i.e. *Priyangu* (Foxtail millet), *Shyamaka* (Barnyard millet), *Ragi* are suggested in '*Bhavprakash*'.

MATERIAL AND METHODS

The information was gathered through an extensive literature review encompassing peer-reviewed journals, scholarly books, government publications, and reputable websites that discuss the nutritional and cultural importance of millet. Additionally, traditional medicinal practices and Ayurvedic literature were examined to find evidence of millet's application in maternal health care. Furthermore, the study involved observing and evaluating the effects of millet-based diets on maternal health within rural or resource-limited communities, with a specific focus on preventing anaemia, managing weight during pregnancy, and facilitating recovery after childbirth.

RESULT AND DISCUSSION

'Why Millet?' - Because it's a much more than just a trend! Millet, a humble grain with a rich history, has been gaining popularity in recent years. While it might seem like a new trend, its resurgence is caused by significant factors that go far beyond momentary food trends.

Here's why millet deserves a place on plate

Every day, 800 women worldwide die from preventable pregnancy and childbirth-related causes, with Indian women accounting for 20% of this total.[2] Non-communicable diseases are responsible for seven out of the top ten causes of death among Indian women, with heart attacks, strokes, anaemia, and respiratory disorders topping the list. Despite breakthroughs in healthcare, adoption of lifesaving therapies and practices for pregnant women remains limited due to gaps in knowledge, legislation, and resources. During pregnancy, women require increased amounts of essential nutrients like folic acid and iron. Millet, a nutrient-dense grain, is particularly beneficial as it is packed with iron, protein, antioxidants, dietary fibre, and electrolytes—all of which are crucial for a healthy pregnancy. The United Nations (UN) has established 17 Sustainable Development Goals (SDGs)[3], including the first three: no hunger, no poverty, and good health and well-being. AYUSH practitioners can propose that these SDGs can be achieved through the following:

i. Climate-resilient crops that are drought-resistant and resistant to pests and diseases.[4]

ii. Nutritional security provided by crops that are rich in dietary fiber and essential nutrients like iron, folate, calcium, zinc, magnesium, phosphorus, copper, vitamins, and antioxidants.

iii. Economic security through the cultivation of crops that can thrive in dry, less-fertile, mountainous, tribal, and non-irrigated areas, with shorter cultivation cycles and lower production costs.

iv. Disease prevention by combating cardiovascular diseases, anemia, calcium deficiency, and other health issues. Gluten-free crops with a low glycemic index can be a valuable substitute for wheat in individuals with celiac disease.

NUTRITIONAL VALUE OF MILLET FOR PREGNANT WOMEN

Millet is a powerhouse of essential nutrients i.e. protein, fibre, complex carbohydrates, minerals, and vitamins. 100 grams of millet contain around 8-10 grams of protein.[5] which is essential for the growth and development of the foetus. Additionally, they are rich in iron, calcium, and folic acid – nutrients that are vital during pregnancy. These nutrients help in preventing anaemia, ensure proper bone development, and support the growth of the neural tube in the foetus, respectively. Dietary fibre prevents

constipation and helps maintain proper blood sugar levels in gestational diabetes. Calcium and folate promote foetal development. Magnesium and potassium regulate blood pressure.

1. **The Roles of Millet in Preventing Anemia During Pregnancy:-** Anaemia is a common health condition that can affect pregnant women. Millet are rich in iron, which is essential for the production of haemoglobin in the body. Additionally, the vitamin C present in millet helps in the absorption of iron, making it an ideal food to consume. They are rich in other vital nutrients such as folate, magnesium, and zinc, which are crucial for the proper development of the foetus.[6]
2. **Millet – A Rich Source of Fiber**:**-** Fiber is an essential nutrient that plays a vital role in maintaining digestive health during pregnancy. Millet is an excellent source of fibre, which helps in preventing constipation, a common problem faced by pregnant women.[7] Additionally, fibre-rich foods help in maintaining blood sugar levels, which is crucial in preventing gestational diabetes.
3. **Millet – Gluten-free Alternatives during pregnancy:-** Gluten intolerance or sensitivity is a common problem faced by many people. Pregnant women with gluten intolerance need to avoid gluten-containing foods, which can limit their food choices. Millet, a gluten-free grain, is a great choice for pregnant women who avoid gluten.[8-9] They can be cooked in a similar way to rice and can be flavored with herbs and spices to enhance their taste. Additionally, millet are versatile. They can be used in a variety of dishes and readily available in most grocery stores, making them a convenient option for pregnant women in case of loss of appetite or gravidarum emesis**.**
4. **Millet – Low Glycemic Index Food for Gestational Diabetes: -** Gestational diabetes is a common concern faced by pregnant women, which can lead to various complications. However, consuming low glycaemic index foods like millet can help in managing gestational diabetes.[10] They release glucose into the bloodstream at a slower pace, preventing a sudden rise in blood sugar levels. In addition to being a low glycemic index i.e Pearl millet [11] they are essential for the healthy growth and development of the foetus, and can also help in maintaining the overall health of the mother.
5. **Millet - in Maintenance of Healthy Weight During Pregnancy:-** During pregnancy Weight gain is expected and healthy, but too much weight gain can cause complications. Millet is low in calories and fat, making them an ideal food to add to the pregnancy diet. They have a high satiety value, which means they keep you full for longer, preventing overeating and excessive weight gain.[12] Millet can be incorporated into the pregnancy diet in various ways. However, it is essential to introduce millet into the diet gradually and in moderation to avoid any digestive discomfort.
6. **Physiological Roles of Millet in Fetal Development:-** High content of folic acid in millet helps in the development of the nervous system of the foetus. Folate helps in preventing birth defects, while magnesium aids in the formation of bones and teeth. Zinc, on the other hand, plays a vital role in the immune system and helps in the growth and development of the baby's brain and nervous system. Apart from this Calcium, which aids in the development of healthy bones in the foetus[13] Millet are also a rich source of iron, which is essential for the formation of red blood cells in the foetus Iron deficiency during pregnancy can lead to anemia in both the mother and the foetus Millet also contain vitamin B6, which helps in the formation of neurotransmitters in the brain of the foetus Therefore, including millet in the diet of pregnant women can have a positive impact on the overall development of the foetus.[14]
7. **Significance of Millet in Post Natal Period**

   According to empirical studies, millet-based diets help breastfeeding mothers and pregnant women have healthier BMIs.[6] Bajara and Ragi are used in folklore diet & Medicine practice for post labour pain relief, Strengthening of Muscles, Uterine contraction and residual Placental Expulsion. Ragi consumption is also suggested for lactating women to boost milk supply as it contains high amount of calcium and polyphenols. Kodo millet are incredibly nourishing, gluten-free, easy to digest, full of phytochemicals, antioxidants, and dietary fibre.

Acharya Charak has classified aharavarga in twelve (12) major categories[15]; Acharya Shushruta has classified Aharavarga in two major categories i.e Dravavarga with further divided in ten(10) categories and Annapaanvarga which further divided in eleven(11) categories[16]; Acharya Vagbhata has also classified into two, major categories i.e Dravavarga and Anna-swarupavarga. Each one is divides into seven (7) categories.[17]

PRECAUTIONS TO TAKE WHILE CONSUMING MILLET DURING PREGNANCY

While Millet is nutritious and safe to consume during pregnancy, it is essential to take certain precautions. Pregnant women with a history of allergies should start to take millet after medical checkup. Additionally, it is recommended to wash and soak Millet before cooking to remove any dirt or debris.It is important to ensure that Millet are cooked thoroughly before consumption. Under cooked Millet can cause digestive

issues and may even lead to food poisoning. It is also recommended to consume Millet in moderation, as excessive consumption may cause an increase in blood sugar levels. As per Ayurveda, Millet having उष्ण तीक्ष्ण रुक्ष properties should be avoided in पित्तप्रकृति (hot nature/body constitution) persons and in उष्णकाल (i.e. summer).common properties of kshudradhanya- *kinchitushan*(keep warmth but in low ratio), *madhur and kashaya rasa* (sweet and astringent in taste), *laghu* (cooked easily, keeps body in lighter side), *lekhan*(to remove excess fat/ adipose tissue), *vipakkatu*(absorbed in circulation as a pungent taste product), *ruksha*(if we eat- it results dryness in the body), *adartashoshaka*(it pulls out water via hot astringent properties of millets), *vatkarak*(generally amplifies the flow of movement), *malabaddhakara*(to bind/shape solid- fecal matter via astringent property), *raktavikar* and *kaphavikarnashak* (purifies blood.and reduces fat).

CONCLUSION

Millet, a collective term for a variety of small-seeded grasses, is rich in essential nutrients and is often classified as a superfood. The cultivation of millet is increasingly recognized as a viable approach to fostering sustainable agricultural practices and promoting a healthier environment. This crop has the potential to address issues related to nutritional security, the stability of food systems, and the welfare of farmers. Furthermore, millet's unique attributes render it particularly suitable for the diverse agro-climatic conditions found in India. In recognition of its significance, the year 2018 was proclaimed the National Year of Millet, with India advocating for 2023 to be designated as the "International Year of Millet." The Central Council for Research in Ayurvedic Sciences (CCRAS) has developed a framework for the accurate documentation of local health traditions and the practices of ethnic practitioners across various communities. Despite being acknowledged as a "Shree Dhanya -super food," millet is still often perceived as a food for the economically disadvantaged. Consequently, there is a pressing need to rebrand coarse cereals and millet as nutri-cereals to enhance their production and consumption. In 2020, approximately 287,000 women lost their lives during or following childbirth, with low and lower middle-income countries accounting for nearly 95% of these maternal deaths, most of which were preventable. By implementing a millet-based, cost-effective diet alongside other lifestyle changes, it is possible to work towards the World Health Organization's goal of saving over one million maternal and newborn lives by 2030.

Financial Support

Nil

Conflicts of Interest

Nil

References

1. Sharma, P., & Sharma, S. (2019). "Garbhini Paricharya: Ancient Ayurvedic approach to antenatal care."; International Journal of Ayurvedic Medicine, 10(1), 22-27.
2. Buñing, M. C. B. (2022). Mothers' Lives Matter: Reaffirming Commitments from the Past to Strengthen the Future. Acta Medica Philippina, 56(16). https://doi.org/10.47895/amp.v56i16.6580.
3. Shahryar Sorooshian (2024) The sustainable development goals of the United Nations: A comparative midterm research review; ,Journal of Cleaner Production ,Volume 453, 2024,142272, ISSN 0959-6526, https://doi.org/10.1016/j.jclepro.2024.142272.
4. Kumar, A., Tomer, V., Kaur, A., Kumar, V., & Gupta, K. (2018). "Millets: a solution to agrarian and nutritional challenges." Agriculture & Food Security, 7(1), 1-15.
5. Adeniran, O. I., Olayinka, B. U., Adebola, M. O., & Atoyebi, A. R. (2020). "Nutritional composition of millets and their role in human health: A review."; Journal of Food Science and Nutrition, 3(4), 132-144.
6. Sharat, D. D., & Gokhale, D. (2022). Nutritional Impact of Millet-based Foods on Pregnant and Nursing Women from Anganwadi Centers in Mahabubnagar. International Journal of Nutrition Pharmacology Neurological Diseases, 12(2), 66–71. https://doi.org/10.4103/ijnpnd.ijnpnd_60_2.
7. Gahalawat P, Lamba N, Chaudhary P. Nutritional and health benefits of millets: a review article. Journal of Indian System of Medicine 2024;12 :4-11.
8. Asrani, P., Ali, A., & Tiwari, K. (2022). Millets as an alternative diet for gluten-sensitive individuals: A critical review on nutritional components, sensitivities and popularity of wheat and millets among consumers. Food Reviews International, 39(6), 3370–3399. https://doi.org/10.1080 /87559129. 2021.2012790.
9. Manivannan Selladurai, Manoj Kumar Pulivarthi, Anu Suprabha Raj, Mehreen Iftikhar, P.V. Vara Prasad, Kaliramesh Siliveru(2023). Considerations for gluten free foods - pearl and finger millet processing and market demand, Grain & Oil Science and Technology, 6(2), 2023 : 59-70, ISSN 2590-2598, https://doi.org /10.1016/j.gaost.2022.11.003.

10. Vedamanickam, R & Anandan, P & Giridharan, Bupesh & Sakthivel, Vasanth(2020). Study of millet and non-millet diet on diabetics and associated metabolic syndrome, Biomedicine: 2020; 40(1): 55- 58.
11. Owish, Khalid Abbas & Rihab, Ibrahim & Abdalla, & Humeda, Humeda & Omer Alameen, Ahmed & Mubarak, Eltayeb. (2020). Effect of Pearl Millet on Glycaemic Control and Lipid Profile in Streptozocin Induced Diabetic Wistar Rat Model; 18: 40-52. DOI-10.9734/AJMAH/2020/v18i330193.
12. Anitha S, Upadhyay S and Kane-Potaka J (2024) Millets have the potential to increase satiety and reduce the feeling of hunger: a systematic review. Front. Sustain. Food Syst. 8:1348068.doi: 10.3389/fsufs.2024.1348068.
13. Devi, S., Varghese, E., & Mary, P. (2021). "Nutritional Benefits of Millets During Pregnancy: A Comprehensive Review." International Journal of Research in Medical Sciences, 9(3), 892-898.
14. Singh, M., & Bhargava, S. (2018). "Role of millets in pregnancy: A traditional and clinical perspective." International Journal of Food Science and Nutrition, 3(2), 84-88.
15. Yadav T, editor, Charak Samhita of Agnivesh, sutra sthana, chapter 27,.3rd edition, Varanasi: Chaukhamla Surabharati Prakashana, 2008. P.526
16. Sushruta SS, Vol I. by Shastri Kaviraja Ambikadutta. Sutra Sthana; Chapter 46; 2014:P 243-244.
17. Ashtang Hridaya of Vagbhat, sutrasthana , Chaukhambha Prakashan Varanasi; Sutra Sthan chapter 6 – Annaswarup vidnyaniya; chaukhambha Sanskrit series 8 ; chaukhambha orientalia publication(2006) ,P 867.