



## Millet Consumption: Benefits with Special Reference to Reproductive Wellbeing of Female Young Female Adults

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### Abstract

Millet's nutritional worth and potential health advantages make them essential for women's reproductive health. Finger millet, pearl millet, and other millets provide iron, calcium, magnesium, and B-complex vitamins, which are needed for reproductive organ development, pregnancy, and lactation. They also aid digestion, weight loss, and diabetic management. Millets are gluten-free, making them suitable for celiacs. Millets' antioxidant, anti-inflammatory, and immunomodulatory capabilities can protect against age-related degenerative diseases like cardiovascular disease, diabetes, and cancer, according to research. Millets may also help manage reproductive health issues like Polycystic Ovary Syndrome (PCOS). They also clean and boost reproductive systems in men and women. Millets' nutritional content and health advantages indirectly assist women's reproductive health, while their direct effect is unknown. This paper emphasizes mother and fetal nutrition throughout pregnancy and the need of eating a varied diet including fruits, vegetables, and whole grains. In conclusion, millets may improve women's reproductive health. Millets should be part of a varied diet to improve pregnancy, lactation, and reproductive health. To customize diets, healthcare practitioners or nutritionists must be consulted.

Millets play a crucial role in ensuring nutritional security, thereby necessitating the promotion of their consumption due to their remarkable nutritional value. Millets have played a significant role as food staples since ages, particularly in the regions of Asia and Africa. However, the consumption of sorghum and other millets as primary food sources has experienced a substantial reduction over the course of the last thirty years which in turn has resulted in a significant reduction in millet production in India. The production of sorghum in India experienced a decline from 7 million tonnes in the 2010-11 period to 4.2 million tonnes in 2015-16. Additionally, small millets production witnessed a decrease from 0.44 million tonnes to 0.39 million tonnes during the same time frame. In spite of significant reduction in the production and consumption of millets over the last three decades, Sorghum millet is recorded as the fifth most significant cereal crop globally, following maize, rice, wheat, and barley (Food and Agriculture Organization, 2005).

Millet has multiple varieties, namely Sorghum, pearl millet, finger millet, foxtail millet, common millet, little millet, barnyard millet, and kodo millet. The majority of millet varieties are predominantly utilized for human food in underdeveloped nations, but their utilization in developed countries has primarily been limited to animal feed.

Sorghum millet possess the characteristic of being devoid of gluten, hence rendering them valuable as cereals for dietary purposes (Shabnam, Kumari & Gupta, 2023). Millets are commonly recognized as a significant dietary source of fiber, minerals, and vitamin B-complex. The bioavailability of minerals in millets is influenced by their high fibre content as well as the presence of certain anti-nutritional substances such as phytates and tannins. The absorption of iron from millets is lower compared to that from rice or wheat. Millets include a variety of health-promoting phytochemicals, such as polyphenols, lignans, phytosterols, phytoestrogens, and phytocyanin which serve as antioxidants, immunological modulators, and detoxifying agents, hence providing protection against age-related degenerative diseases such as cardiovascular diseases (CVD), diabetes, and cancer (Sireesha et al., 2011).



Samtiya et al. (2023) studied the current and future perspectives of nutritional and health-promoting attributes of millet and revealed many nutritional characteristics of millet seeds and their derivatives that are important to human health such as antioxidant, antihypertensive, immune-modulatory or anti-inflammatory, antibacterial or antimicrobial, hypocholesterolemic, hypoglycemic, and anti-carcinogenic potential, and their role as modulators of gut health. The study also revealed the health-promoting properties of the natural components such as proteins, peptides, polyphenols, polysaccharides, oil, is flavones, etc. present in millet seeds.

Millets, due to their lack of gluten, are considered a safe dietary option for individuals afflicted with gluten allergies and celiac disease. According to Saleh et al. (2013), these substances have non-acidic properties, are readily digestible, and do not typically induce allergic reactions. Millets possess considerable promise in safeguarding against age-related degenerative ailments. The consumption of millets has been associated with a range of health benefits. These include a reduced risk of heart disease, protection against diabetes, improved digestive system function, lowered risk of cancer, detoxification of the body, enhanced immunity in respiratory health, increased energy levels, and improved muscular and neural systems. Additionally, millets have been found to offer protection against various degenerative diseases, such as metabolic syndrome and Parkinson's disease (Chandrasekara and Shahidi, 2012). Thus, millets is recognized to have multi-faceted health benefits. However, the present paper is focused on benefits of millets with reference to reproductive health of women.

The significance of millets in women's reproductive health stems from their nutritional makeup and potential health advantages. The significance of reproductive health for women lies in its potential to influence fertility, maternal health, and the holistic welfare of both the mother and the offspring. Though there is dearth of researches proving the benefits of millets on reproductive health directly but the significant role of millets in promoting reproductive health can be traced indirectly through the following mechanisms:

(i) Millets, such as finger millet (ragi), pearl millet, and other varieties, have a high nutrient content, including vital elements such as iron, calcium, magnesium, and B-complex vitamins. These nutrients hold significant relevance in the context of women's reproductive health. The presence of these nutrients is crucial for the development and operation of reproductive organs, as well as for the processes of pregnancy and breastfeeding.

(ii) The iron content of the subject matter is being discussed. Iron has a crucial role in the health of women, especially throughout their reproductive years. Iron deficiency has the potential to result in anaemia, hence exerting adverse effects on the outcomes of pregnancy. Millets, particularly finger millet (ragi), include significant iron content and exhibit potential in the prevention and management of iron-deficiency anaemia.

(iii) Folate and B-vitamins are essential nutrients that play a crucial role in various physiological processes. Millets are a rich source of folate, sometimes known as vitamin B9, as well as other B-complex vitamins. Folate is a crucial nutrient for women in the reproductive age group, since it plays a vital role in the prevention of neural tube abnormalities in infants. Sufficient consumption of B-vitamins is furthermore crucial for promoting a healthy pregnancy and facilitating optimal fetal growth.

(iv) Dietary fibre is a crucial component of a healthy diet. Millets are considered to be a valuable nutritional component due to their high content of dietary fibre, which plays a crucial role in promoting optimal digestive health. Adequate digestion plays a crucial role in the absorption of nutrients and the overall well-being of individuals during the periods of pregnancy and lactation.

(v) The consumption of certain millets with a low glycaemic index has been associated with the potential to stabilize blood sugar levels. This holds significant importance for women who have gestational diabetes or are susceptible to acquiring diabetes during the course of their pregnancy.



(vi) Weight management is a crucial aspect of maintaining a healthy lifestyle. The consumption of millets can contribute to the maintenance of a healthy weight among women, a factor that holds significant importance for their reproductive health. Both being underweight and overweight have the potential to impact fertility and the results of pregnancy.

(vii) Millets is beneficial for promoting lactation. Incorporating millets into the postpartum diet can contribute to the provision of essential energy and nutrients required by nursing mothers to sustain an optimal production of breast milk.

(viii) Non-allergenic refers to substances or products that do not cause an allergic reaction in individuals. Millets possess a natural absence of gluten, rendering them appropriate for consumption by those with celiac disease or those who exhibit sensitivities to gluten. This practice guarantees that these individuals of the female gender can fulfil their dietary requirements without experiencing any negative consequences associated with the use of gluten.

(ix) Millets are known to possess antioxidants, specifically polyphenols, that have the potential to safeguard reproductive cells from oxidative damage and enhance overall well-being.

(x) Millets is beneficial for balancing nutritional balance. Millets provide a harmonious blend of carbs, proteins, and fats, thereby facilitating a comprehensive dietary intake for women throughout their reproductive lifespan.

(xi) Millets possess a comprehensive array of essential nutrients that are conducive to the management of Polycystic Ovary Syndrome (PCOS) and can also facilitate progress in one's weight loss endeavours. Polycystic ovarian syndrome (PCOS), an endocrine condition that affects around 6-10% of women in their reproductive years, presents significant challenges in reproductive health. Women who are affected by PCOS may encounter an irregularity in their menstrual cycle, the development of cysts in their ovaries, an excessive growth of body hair, weight gain, the presence of oily skin, and potentially even infertility. The management of polycystic ovary syndrome (PCOS) can be significantly influenced by dietary choices and lifestyle factors. Several studies have indicated that the inclusion of millets in the dietary regimen may have potential benefits in mitigating inflammation and enhancing lipid profiles in women diagnosed with polycystic ovary syndrome (PCOS). Millets have the potential to contribute to weight loss, hence perhaps mitigating associated difficulties. There is a notable disparity in the prevalence of insulin resistance between obese women with polycystic ovary syndrome (PCOS) and their lean counterparts, with the former group exhibiting a 30% higher incidence. Millets possess a notable abundance of essential nutrients such as calcium, protein, iron, and amino acids, which are vital for effective nutritional management.

(xii) It has been found that little millet cleanses up the reproductive systems (gonads - uterus, testicles) and corrects ovary related issues in women. It also improves the reproductive strength in men. It also corrects menstrual disorders and also helps in PCOD and other gynaec problems.

Jain, Chawla and Yadav (2023) conducted a comprehensive review on nutrient requirement and guidelines during pregnancy. The study highlighted the necessity of maternal and foetal nutrition during pregnancy for optimum growth and development. In order to improve maternal and foetal health outcomes, it provides a comprehensive assessment of the latest information on dietary needs and recommendations for expectant mothers. Women who are pregnant or breastfeeding should have a balanced diet high in protein, vitamins (A, C, B1, B2, and foliate), iron, and fibre. Foetal mal-development, preterm birth, and an upped chance of developing chronic diseases have all been linked to poor maternal nutrition. Pregnant women, and their unborn children, depend on their mothers for food, thus it's important that they eat well during their pregnancies. The report concluded by stressing the significance of prenatal nutrition and offering recommendations for meeting nutrient needs and achieving optimal nutrition. As



millet contains all the nutrients required for pregnant mothers and foetus, thus eating millets can indirectly found to impact reproductive health and well-being of young females.

It is imperative to acknowledge that although millets have several advantages for reproductive health, the consumption of a well-rounded and varied diet is of utmost importance. In order to get a well-rounded nutritional profile, it is recommended to incorporate a diverse range of food items into one's diet, such as fruits, vegetables, and whole grains.

In nutshell, millets possess the potential to contribute significantly to the promotion of women's reproductive health, owing to their abundant nutrient composition and capacity to mitigate nutritional inadequacies. When incorporated into a well-rounded dietary regimen, millets have the potential to enhance a woman's holistic state of health, promote conception, and support optimal outcomes throughout pregnancy and breastfeeding. Nevertheless, it is imperative to seek guidance from a healthcare practitioner or nutrition specialist in order to develop an individualized dietary regimen that aligns with distinct requirements and objectives. However more researches are required to get authentic proof of benefits of millets in enhancing reproductive health of females.

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