International Journal on Science and Technology (IJSAT)
E-ISSN: 2229-7677 ● Website: www.ijsat.org ● Email: editor@ijsat.org

Role of Millets in Hormonal Disorders: PCOS, Menopause, and Thyroid Health

Ms. Sejal Shrikant Shivale

Abstract

Hormonal imbalance such as PCOS, menopause and thyroid complications are felt by millions of women worldwide and are more likely to lead to long term health problems such as metabolic disorders, bone density and fatigue. With the global modern medical world studying the dietary approach to handling these conditions, millets have made their way into the light with their nutritious profile and their potential benefits to human health (Nair, 2023). Millet is a good source of essential minerals, fibre content, and low glycemic index, which is a potential natural alternative to conventional treatment. This literature review explores how millets can help manage three of the most common hormonal diseases, PCOS, menopause, and thyroid dysfunction, according to recent nutritional research and clinical findings.

Literature Review

Hormonal imbalance such as PCOS, menopause and thyroid complications are felt by millions of women worldwide and are more likely to lead to long term health problems such as metabolic disorders, bone density and fatigue. With the global modern medical world studying the dietary approach to handling these conditions, millets have made their way into the light with their nutritious profile and their potential benefits to human health (Nair, 2023). Millet is a good source of essential minerals, fibre content, and low glycemic index, which is a potential natural alternative to conventional treatment. This literature review explores how millets can help manage three of the most common hormonal diseases, PCOS, menopause, and thyroid dysfunction, according to recent nutritional research and clinical findings.

Role of Millets in PCOS

Polycystic Ovary Syndrome (PCOS) is a multi-factorial endocrine disease that is also characterized by the existence of multiple cysts, which can affect up to 6-20 percent of women of reproductive age in the world (Jadhav, Naganuri and Hiremath, 2023). Chronic anovulation, hyperandrogenism and polycystic ovaries are the central characteristics of PCOS. The abnormal periods, infertility, weight gain, acne, and excess hair growth are symptoms of hormonal imbalance which are principally high androgens and insulin regulation (Anand and Chawla, 2023). Insulin resistance is especially in the centre of the pathophysiology of PCOS, and its existence makes the situation even more severe by enhancing the synthesis of androgens in ovarian theca cells, which worsens the symptoms. Metabolic burden is increased by insulin resistance, which is observed in up to 70 percent of PCOS obese women, compared to 30 percent in lean ones (Anand and Chawla, 2023).

Millets have become an effective dietary supplement to control PCOS because it is a good source of fiber, low GI, and micronutrients. Nutritional reviews and clinical trials have also shown that when millets are included, they bring significant benefits in terms of insulin sensitivity, lipid, and meta-health levels among PCOS-affected women (Jadhav, Naganuri and Hiremath, 2023). More specifically, finger millet (Eleusine coracana), pearl millet (Pennisetum glaucum), foxtail millet (Setaria italica), and kodo millet (Paspalum

scrobiculatum) have a high amount of dietary fiber, iron, magnesium, and antioxidants, all of which have been known to contribute to better glycemic control and a decrease in oxidative stress (Nair, 2023). To give an example, finger millet has about 344 mg of calcium and 8.9 mg of iron in every 100 grams, which makes it a great food in treating the prevalent iron-deficiency anaemia in PCOS women who have irregular periods and heavy menstrual bleeding (Roychoudhury and Das, 2023).

Research has discovered that insulin resistance can be abridged by millet consumption by several processes. A review by Jadhav et al. (2023) linked high dietary fiber content within millets to a decrease in fasting insulin and glucose-improved metabolism. Prebiotic compounds such as resistant starch, non-starch polysaccharides also contribute to a healthy population of gut microbiota by enhancing the presence of positive bacteria, including Bifidobacterium and Lactobacillus, associated with enhancing insulin sensitivity and lipid profiles. In addition, antioxidant agents in millets, such as polyphenols, contribute to combating oxidative stress, which is a significant factor in the pathogenesis of PCOS (Jadhav, Naganuri and Hiremath, 2023). There are also data that barnyard millet with its high total fiber content of 12.6% (4.2% soluble and 8.4% insoluble) can improve postprandial glycemic response and can substantially attenuate insulin spikes (Roychoudhury and Das, 2023).

The beneficial effects of millets on weight management, another critical aspect of PCOS treatment, are well documented. Weight loss of even 5% has been shown to improve ovulatory function and reduce hyperandrogenemia. Millets contribute to satiety due to their complex carbohydrate structure, which slows glucose absorption and promotes longer fullness. For example, foxtail millet, rich in dietary fibre and iron, supports reduced visceral fat and healthier menstrual cycles in women with PCOS (Nair, 2023).

S.No.	Millets	Protein (gm)	Fiber(gm)	Minerals (gm)	Iron(gm)	Calcium (gm)
1	Sorghum	11	6.7	2.7	3.4	13
2	Finger millet	7.3	3.6	2.7	3.9	344
3	Kodo millet	8.3	9	2.6	0.5	27
4	Little millet	7.7	7.6	1.5	9.3	17
5	Pearl millet	10.6	1.3	2.3	16.9	38
6	Wheat	16.44	14.64	3.3	4.66	40.8

Figure 1: Nutrient value of Millets

Source: (Shalini, Suresh and Uthaya Ganga, 2024)

Additionally, as seen in the figure 1 above, millets such as pearl millet (with 10.6g protein/100g) and kodo millet (with 9g dietary fiber/100g) assist in muscle development and support metabolic rate, both of which are crucial for weight control (Shalini, Suresh and Uthaya Ganga, 2024).

Hormonal balance is another area where millets have demonstrated impact. Although direct evidence linking millet consumption to modulation of estrogen and progesterone levels is limited, the correction of menstrual irregularities and improvement in reproductive system health through dietary intervention is significant. Little millet has been traditionally used to cleanse the gonads and manage ovary-related issues, improving menstrual regularity (Anand and Chawla, 2023). Magnesium, abundant in millets, is known to relax uterine muscles and alleviate menstrual cramps, which are common in women with PCOS. Further, the B-complex vitamins in millets, particularly folate (85 mcg/100g), niacin (4.720 mg/100g), and thiamine (0.421 mg/100g), are essential for reproductive health and hormonal synthesis (Nair, 2023).

The Siddha medicine framework recognizes PCOS as "Garpavaayu," characterized by disturbances in the Vaatham humour, which controls ovulation and menstrual flow. According to Shalini et al. (2024), millet

varieties such as kodo millet, finger millet, and pearl millet, with their sweet taste profile and cold potency, help pacify Vaatham and Pitham, restoring humoral balance. This traditional dietary logic aligns with modern findings where millets enhance metabolic functions, reduce insulin resistance, and contribute to hormonal harmony. In one comparative study within the Siddha paradigm, pearl millet was noted to contain 16.9 mg of iron/100g, making it particularly suitable for anemic women with PCOS (Shalini, Suresh and Uthaya Ganga, 2024).

Western dietary frameworks also support these claims. A systematic review by Xenou and Gourounti (2021) analyzed seven dietary studies and confirmed that diets emphasizing low GI carbohydrates, dietary fiber, and antioxidants, such as those found in Mediterranean, DASH, and aMED diets- significantly reduced insulin resistance and hyperandrogenism in PCOS patients. In one specific study, 24 obese women on a low-starch and dairy-free diet exhibited improved insulin sensitivity and decreased free testosterone after eight weeks (Xenou and Gourounti, 2021). Another study reported that a ketogenic Mediterranean diet led to reductions in insulin, cholesterol, triglycerides, and androgens, highlighting the metabolic importance of dietary components found in millet-based foods.

Despite the promising evidence, limitations in existing research must be acknowledged. Most studies rely on small sample sizes or are preclinical in nature, such as animal-based studies on finger millet's hypoglycemic effects (Roychoudhury and Das, 2023). Moreover, long-term clinical trials evaluating hormonal markers like LH/FSH ratio, testosterone levels, and menstrual cycle regulation after consistent millet consumption are sparse. Jadhav et al. (2023) recommend that larger randomized controlled trials are needed to firmly establish millets in dietary guidelines for PCOS management.

Role of Millets in Menopause

Menopause is a natural physiological transition in a woman's life, typically occurring between ages 45 and 55, marked by a decline in estrogen and progesterone levels. This hormonal shift induces a spectrum of symptoms, including hot flashes, mood instability, fatigue, anxiety, sleep disturbances, and a substantial risk of osteoporosis due to reduced bone mineral density (BMD) (Nair, 2023). Given the elevated risks of cardiovascular and metabolic disorders during this stage, managing menopause through dietary strategies that address hormonal and structural deficiencies has become an area of increasing focus.

One of the primary nutritional concerns during menopause is calcium deficiency, which directly contributes to osteoporosis. Finger millet (Eleusine coracana), commonly known as ragi, emerges as a highly potent dietary intervention due to its exceptionally high calcium content of 344 mg per 100g- 30 times more than rice and three times that of milk (Dube, Varade & Choudhari, 2024). This makes it the richest calcium source among cereals and millets, positioning it as an ideal natural alternative to synthetic calcium supplements, which may cause side effects like kidney stones or constipation due to modest bioavailability (Dube, Varade & Choudhari, 2024). Despite lacking data on vitamin D synergy, which aids in calcium absorption, finger millet's nutrient-rich matrix, featuring magnesium, phosphorus, zinc, dietary fiber (15–20%), and essential amino acids like methionine and lysine, enhances its functional role in improving bone integrity and systemic health during menopause (Dube, Varade & Choudhari, 2024).

Table 1: Comparative Effect of Millets vs. Control Diet in Ovariectomized Rats

Parameter	Control (OVX Rats)	Millet-Fed Group	% Improvement
Body Weight (g)	286.67 ± 9.87	203.0 ± 4.73	↓ 29.2%

Blood Glucose (mg/dL)	116.0 ± 1.55	80.37 ± 0.55	↓ 30.7%
Total Cholesterol (mg/dL)	260.0 ± 10.0	174.33 ± 8.14	↓ 33.0%
HDL (mg/dL)	37.67 ± 2.51	71.33 ± 1.50	↑ 89.3%
HbA1c (%)	7.77 ± 0.81	4.5 ± 0.3	↓ 42.1%

Note: $P < 0.05$ for all comparisons

Source: (Chandra Prabha & Selvi, 2016)

Experimental research further validates these benefits. In a controlled animal model mimicking menopause, ovariectomized rats fed with a blend of four minor millets- Paspalum scrobiculatum, Panicum sumatrense, Echinochloa frumentacea, and Setaria italic- demonstrated statistically significant improvements in multiple menopausal markers (Chandra Prabha & Selvi, 2016).As seen in the table 1 above, after 11 weeks, millet-fed rats exhibited a dramatic reduction in body weight (final weight: 203±4.73g) compared to ovariectomized controls (286.67±9.87g), suggesting metabolic stabilization ($P < 0.05$). Likewise, their blood glucose level dropped to 80.37±0.55 mg/dl from 116±1.55 mg/dl in the control, with HbA1c declining to 4.5±0.3% from 7.77±0.81% ($P < 0.05$), indicating millets' hypoglycemic potential in estrogen-deficient states.

Cardiovascular risk factors are also mitigated through millet consumption. The millet-fed group demonstrated a substantial decrease in total cholesterol (174.33±8.14 mg/dl vs. 260±10 mg/dl), LDL (85.67±2.08 mg/dl vs. 183.67±1.53 mg/dl), triglycerides (156.67±9.87 mg/dl vs. 268.67±3.2 mg/dl), and VLDL (25.67±0.5 mg/dl vs. 53.73±0.64 mg/dl), with HDL significantly improving from 37.67±2.51 to 71.33±1.5 mg/dl ($P < 0.05$ for all) (Chandra Prabha & Selvi, 2016). Moreover, the atherogenic index- a composite marker of cardiovascular risk, reduced from 5.93±0.61 to 1.44±0.14. These results underscore millets' capacity to restore lipid metabolism disturbed by hormonal insufficiency.

In addition to metabolic benefits, millets exhibit antioxidant and anti-inflammatory properties. The study reported lowered TBARS levels, reflecting reduced oxidative stress in millet-fed rats compared to untreated controls (Chandra Prabha & Selvi, 2016). Histopathological examinations of heart tissue revealed that millet-fed rats had well-preserved cardiac muscle architecture with fewer necrotic changes and inflammatory infiltrates, suggesting protection against cardiovascular degradation commonly seen in postmenopausal women.

Nutrient	Amount per 100g
Carbohydrates	146g
Protein	22g
Fibre	13.3g
Ca	16mg
Zn	3.4mg
P	370mg
K	390mg
Mn	228mg

Figure 2: Nutrient content of pearl millet

Source: (Nzila, 2019)

Human trials have also been initiated to examine millets' therapeutic potential. In Kitui County, Kenya, an intervention involving 93 osteoporotic women aged 40–65 is currently underway. Participants consume 60g/day of baobab-fortified pearl millet flour over six months, and BMD is assessed using DEXA scans (Nzila, 2019). Although results are pending, the formulation boasts a nutritional profile of 22g protein, 13.3g fiber, and critical bone health minerals like 16mg calcium and 3.4mg zinc per 100g as seen in the figure 2 above (Nzila, 2019). Baobab's high vitamin C (173.2mg/100g) is expected to enhance calcium absorption and collagen production, both critical for bone strength. If proven successful, this "super flour" could become an evidence-backed, scalable intervention in menopausal osteoporosis management.

Beyond structural health, millets significantly impact psychological and hormonal wellbeing. Millets, particularly rich in magnesium (28% RDA per 100g), support stress reduction by regulating cortisol levels and aiding neurotransmitter synthesis (Nair, 2023). Furthermore, the amino acid tryptophan in millets boosts serotonin production, directly alleviating anxiety and promoting restful sleep- two common challenges in menopause (Nair, 2023). Millets like pearl, foxtail, finger, and barnyard varieties offer rich B-complex vitamins including niacin (4.72 mg/100g), thiamine (0.421 mg), and B6 (0.384 mg), which further enhance mood regulation (Nair, 2023).

Millets also contribute phytoestrogens, plant-based compounds structurally similar to estrogen, that modulate estrogen receptors and partially compensate for hormonal decline. While variety-specific data on phytoestrogen content is limited, their general presence in millets is recognized for maintaining hormonal balance and supporting cardiac function in menopausal women (Nair, 2023). These effects position millets alongside other known phytoestrogen sources like soy, with the added benefit of being hypoallergenic and more culturally integrated into Indian diets.

From a public health perspective, millet-based diets have also shown promise in reducing the prevalence of osteoporosis in Indian women, reported to be 8% by the Indian Council of Medical Research (Dube, Varade & Choudhari, 2024). Sharma, Rajput, and Rathore (2021) endorse the inclusion of finger and fox millets into regular wheat flour blends as part of a wholefood strategy to prevent bone loss. Their recommendations align with Ayurvedic interpretations, citing millets' ability to balance Vata dosha, a known contributor to bone weakening (Asthikshaya). Additionally, the integration of other calcium-rich foods like broccoli, okra, and mustard seeds, along with lifestyle changes such as physical activity, is emphasized to complement millet-based interventions (Sharma, Rajput & Rathore, 2021).

ROLE OF MILLETS IN THYROID HEALTH

Thyroid hormones, triiodothyronine (T3) and thyroxine (T4), are critical regulators of metabolism, growth, and development. They are synthesized in the thyroid gland and require various micronutrients like Iodine and selenium, enzymes like thyroid peroxidase (TPO) activity (Babiker et al., 2020). The upset of this balance can cause disorders like hypothyroid diseases, which is manifested by feeling tired, gaining weight, and becoming cold, and hyperthyroid diseases, including anxiety, weight loss, and becoming hot. Hashimoto thyroiditis, which is an autoimmune cause of hypothyroidism, and Graves disease, a more common cause of hyperthyroidism, are especially prone to dietary influences and nutrient deficiencies (Babiker et al., 2020).

The lack of iodine is the primary cause of hypothyroidism in most countries because it is the essential component of thyroid hormone synthesis (Babiker et al., 2020). Zinc and selenium are also integral; selenium, in particular, aids in converting T4 to the active T3 hormone. While selenium supplementation has shown temporary improvements in Graves' disease patients, clinical consensus on long-term benefit

remains elusive due to insufficient trials (Babiker et al., 2020). Despite iodine fortification programs in several countries such as India, Indonesia, and the Philippines, micronutrient-related thyroid dysfunction still persists, prompting interest in dietary interventions. In this context, millets- nutri-cereals with high fiber, antioxidant, and micronutrient content, are increasingly studied for their potential role in thyroid regulation.

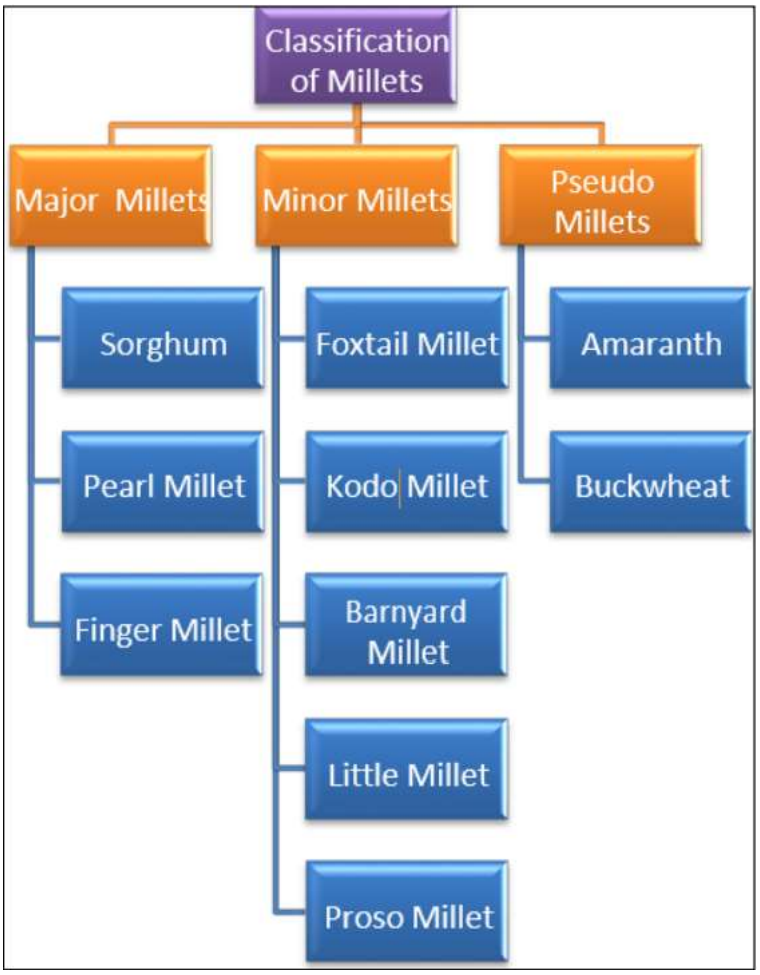

Figure 3: Classification of Millets
Source: (Sanjay, Basarkar and Buchake, 2022)

Millets, such as foxtail, pearl, finger, and kodo millet, are naturally gluten-free and rich in magnesium, fiber, and antioxidants (Sanjay, Basarkar and Buchake, 2022). As seen in the figure 3 above, millets are classified into three categories: major millets, minor millets, and pseudo millets. This classification highlights the diversity among millet types, with foxtail, pearl, and finger millets being common examples of minor millets, which are particularly beneficial for individuals with autoimmune thyroid conditions like Hashimoto's thyroiditis, who often benefit from gluten-free diets. Sorghum and amaranth, also classified under gluten-free cereals, provide suitable alternatives for celiac and thyroid-sensitive individuals (Sanjay, Basarkar and Buchake, 2022). Furthermore, the magnesium content, especially in finger millet (approx. 137 mg), can aid metabolic regulation and help reduce the risk of co-morbid conditions such as insulin resistance and anemia, both of which often accompany hypothyroidism (Sanjay, Basarkar and Buchake, 2022).

Table 2: Goitrogenic Impact of Pearl Millet in Animal and Human Studies

Study Location	Millet Intake (% Energy)	Goiter Prevalence	Key Finding
Sudan (Rural)	74%	42%	High millet → thyroid enlargement
Sudan (Urban)	37%	16%	Lower millet → lower goiter risk
Rat Model	N/A	+137% Thyroid Mass	Vitexin, orientin → inhibit TPO
Goat Study	Millet diet + iodine	No reduction	Goitrogens overpower iodine effect

Source: (Anitha et al., 2024)

However, the consumption of millets, particularly pearl millet, has triggered ongoing debate due to its potential goitrogenic properties. In a comprehensive systematic review, Anitha et al. (2024) examined multiple studies that linked high pearl millet intake with goiter development, particularly in iodine-deficient populations. As shown in Table 2 above, one notable case from Sudan found that rural populations deriving 74% of energy from millet had higher goiter prevalence compared to urban populations (37% millet intake). Animal studies reported significant thyroid enlargement, with rat thyroid glands increasing from 24.7 mg to 58.5 mg ($p < 0.02$) when fed pearl millet, and a dramatic 85% inhibition of TPO activity due to C-glycosylflavones such as vitexin and orientin (Anitha et al., 2024).

These compounds were found to hinder iodide incorporation into thyroglobulin, a critical step in hormone synthesis. Human studies, albeit limited in number and often cross-sectional in design, reinforced this concern. For example, a Sudanese population with a median urinary iodine level of 0.79 µmol/L (indicating adequate iodine) still had a goiter prevalence of 22% due to elevated thiocyanate levels (257 µmol/L), presumably from high millet intake (Anitha et al., 2024). Notably, iodization (50 ppm potassium iodate) failed to mitigate goiter incidence in goats fed with millet, indicating that millet's goitrogens may operate independently of iodine availability.

Despite these findings, researchers caution against generalizing such outcomes. Millet-induced thyroid dysfunction appeared context-dependent, influenced by iodine deficiency, protein-energy malnutrition, and excessive reliance on raw or minimally processed millet. In India and Nigeria, where millets are commonly consumed but dietary diversity is higher, such associations with goiter were not observed (Anitha et al., 2024). Furthermore, processing techniques such as dehulling, decortication, cooking, and malting significantly reduce the anti-thyroid compounds in millet, making moderate consumption generally safe for the healthy population (Anitha et al., 2024; Krishnan, 2024).

Krishnan (2024) emphasized the need for public health messaging that balances the metabolic benefits of millets with these nuanced thyroid-related concerns. While millet's phenolic compounds, such as apigenin and luteolin, may contribute to goitrogenic effects, they also offer potent antioxidant benefits that combat oxidative stress and inflammation, both implicated in thyroid disorders. However, the exact trade-off

between these benefits and risks remains uncertain, and Krishnan (2024) called for large-scale clinical trials to inform dietary guidelines.

From a clinical practice perspective, caution is advised. Dr. Nayak (2024) highlighted patient experiences indicating that excessive millet consumption, particularly in thyroid-sensitive individuals, may lead to bloating, constipation, or worsening of symptoms. While 1–2 servings per day are generally well tolerated, individual responses vary. A 2018 mouse study cited by Nayak found that proso millet protein concentrate could reduce TSH, T3, and T4 levels in hyperthyroid models, suggesting potential benefits in hyperthyroidism. However, this data has yet to be replicated in humans. The general recommendation remains moderation, especially for patients with thyroiditis, goiter, or pregnancy-related thyroid issues (Nayak, 2024).

Given the complexity of millet-thyroid interactions, the micronutrient composition of millets also deserves attention. While Babiker et al. (2020) underscore iodine and selenium's central roles in hormone synthesis, most millet varieties do not inherently offer high concentrations of these elements. Thus, millet-based diets should be complemented with other sources such as iodized salt, seafood, and selenium-rich foods to prevent deficiencies. The absence of dietary zinc data in Babiker's paper limits definitive conclusions, but finger and foxtail millet varieties, known for broader mineral profiles, may offer some supplementary benefit (Sanjay, Basarkar and Buchake, 2022).

Research Gap

Although numerous studies highlight the nutritional value of millets in managing specific health markers like blood glucose, lipid levels, and bone density in women with hormonal disorders (Nair, 2023; Chandra Prabha and Selvi, 2016; Babiker et al., 2020), most existing research tends to examine these benefits in isolation, either for PCOS, menopause, or thyroid conditions. This fragmented approach limits our understanding of how millets function across interconnected hormonal systems in women's health. **The key theoretical gap lies in the lack of a consolidated review that critically compares and connects the role of millets across multiple hormonal disorders - PCOS, menopause, and thyroid dysfunction, within one framework.** Addressing this gap through a thematic literature review not only provides a more holistic understanding of millets' role in women's health but also helps identify shared mechanisms, such as insulin resistance and micronutrient deficiencies, that cut across these conditions. This consolidated perspective is essential for guiding future research and public health messaging, especially in regions where millet is already a staple and women's hormonal health issues are on the rise.

References

1. Anand, K. and Chawla, G.K. (2023) "Millet consumption: Benefits with special reference to reproductive wellbeing of female young female adults," *International Advance Journal of Engineering, Science and Management (IAJESM)*, 20(SE). Available at: https://iajesm.in/admin/papers/65586a9448132.pdf.
2. Anitha, S. *et al.* (2024) *Does consumption of pearl millet cause goiter? A systematic review of existing evidence*, p. 1323336. Available at: https://www.frontiersin.org/journals/nutrition/articles/10.3389/fnut.2024.1323336/full.
3. Babiker, A. *et al.* (2020) "The role of micronutrients in thyroid dysfunction," *Sudanese journal of paediatrics*, 20(1), pp. 13–19. Available at: https://tinyurl.com/83vkkdru.

4. Chandra Prabha, K. and Selvi, S. (2016) "Metabolic Impact of Selected Minor Millets Fed Experimental Menopause Induced Rats," *International Research Journal of Biological Sciences*, 5(6). Available at: https://www.isca.in/IJBS/Archive/v5/i6/7.ISCA-IRJBS-2016-091.pdf.
5. Dube, S., Varade, S. and Choudhari, V. (2024) "UTILITY OF FINGER MILLET (RAGI) IN POST MENOPAUSAL OSTEOPOROSIS: A REVIEW," *World Journal of Pharmaceutical Research*, 13(6). Available at: https://tinyurl.com/5n8fu3fv.
6. Jadhav, P., Naganuri, V. and Hiremath, L. (2023) "Millets as a Novel Solution for PCOS Management: a Review," *International Journal For Multidisciplinary Research*, 5(4). Available at: https://www.ijfmr.com/papers/2023/4/5595.pdf.
7. Krishnan, V. (2024) *Editorial: Millets: superfood of the century - challenges and opportunities*, p. 1462567. Available at: https://www.frontiersin.org/journals/nutrition/articles/10.3389/fnut.2024.1462567/full.
8. Nair, R.R. (2023) "Role of millets in women's health," *Ayurvedic Journal of Research in Woman's Healthcare*, 3(1). Available at: https://crsubscription.com/journals/ayurveda/womans-healthcare/articles/2023/%5B14-18%5D-Role-of-Millets.pdf.
9. Nayak, B. (2024) "Can millets benefit thyroid health? A look at the research and patient experiences," *Dr. Brahmanand Nayak*. Available at: https://www.drbrahma.com/can-millets-benefit-thyroid-health-a-look-at-the-research-and-patient-experiences/.
10. Nzila, K.I. (2019) *EFFECTIVENESS OF BAOBAB-PEARL MILLET BLEND ON BONE MINERAL DENSITY OF WOMEN AGED 40-65 YEARS IN KITUI COUNTY, KENYA*. The Technical University of Kenya. Available at: https://repository.tukenya.ac.ke/server/api/core/bitstreams/52aff6ac-0e1d-4821-95de-a41c89f435b6/content.
11. Roychoudhury, S. and Das, T. (2023) *Millets have a great beneficial effect on PCOS (Polycystic Ovary Syndrome) and PCOD (Polycystic Ovarian Disease) patients*. Available at: https://tinyurl.com/8exvrcy7.
12. Sanjay, A.N., Basarkar, G. and Buchake, V. (2022) *Millets: An overview - A treatise on healthy option in daily diet*, *Phytojournal.com*. Available at: https://www.phytojournal.com/archives/2022/vol11issue3/PartB/11-3-5-183.pdf.
13. Shalini, B., Suresh, K. and Uthaya Ganga, R. (2024) "A REVIEW OF MILLETS DIET AS A TRADITIONAL APPROACH TO PCOS (GARPAVAAYU) MANAGEMENT," *Journal of Advanced Zoology*, 45(2). Available at: https://jazindia.com/index.php/jaz/article/download/3897/3428/6157.
14. Sharma, S.N., Rajput, G. and Rathore, K. (2021) "Osteoporosis in females of menopausal age with its dietary prevention and homoeopathic management," *Tantia University Journal of Homoeopathy and Medical Science*, 4(4). Available at: https://www.tjhms.com/uploadfiles/5.%20S.N%20Sharma,%20Gita%20Rajput%20Kanchan%20Rathore%20Osteoporosis.20220206050806.pdf.
15. Xenou, M. and Gourounti, K. (2021) "Dietary patterns and polycystic ovary syndrome: A systematic review," *Mædica - a Journal of Clinical Medicine*, 16(3). Available at: https://www.maedica.ro/articles/2021/3/2021_16(19)_No3_pg516-521.pdf.