INFORMATICS JOURNALS

Short Review

Journal of Natural Remedies
DOI: 10.18311/jnr/2026/52964

eISSN: 2320-3358 | Vol 26(3), 2026 | pp. 625-634

Herbal and Dietary Interventions for Hormonal Health from Menarche to Menopause

Bhawana Bhatt[1*], Sudhakar Kaushik[2], Mohit Sanduja[3], Madhuri Grover[4] and Nishan Singh[5]

[1]Department of Pharmacognosy, School of Pharmaceutical Sciences, Shri Guru Ram Rai University, Dehradun - 248001, Uttarakhand, India; bhawanabhatt729@gmail.com

[2]Department of Pharmacology, School of Pharmaceutical Sciences, Shri Guru Ram Rai University, Dehradun - 248001, Uttarakhand, India

[3]School of Pharmacy and Research, Dev Bhoomi Uttarakhand University, Dehradun - 248007, Uttarakhand, India

[4]School of Medical and Allied Sciences, K.R. Mangalam University, Gurugram - 122103, Haryana, India

[5]Shri Krishna College of Pharmacy, Sitapur - 261001, Uttar Pradesh, India

Abstract

This review addresses herbal and nutritional interventions as important for maintaining women's health between menarche and menopause, particularly in relation to the physiological and hormonal changes that occur at these milestones. During adolescence, adequate intake of iron, calcium, magnesium, and vitamin B is critical for physical development and reproductive maturation. During the reproductive years, folates, vitamin B 12, omega-3 fatty acids, and isoflavones are known to have an effect on fertility, hormone balance, and brain health. Perimenopausal and menopausal stages demand more calcium, vitamin D, antioxidants and phytoestrogens provided by soy and flaxseed to ease vasomotor symptoms, bone health and the risk of chronic ailments. Medicinal plants such as *Asparagus racemosus* (*Shatavari*), *Withania somnifera* (*Ashwagandha*), and *Moringa oleifera* (*Moringa*) are adaptogenic and hormone-modifying and are even more effective in supporting the health of women. The comprehensive approach of nutrient-rich foods and evidence-based herbal treatments should be used as a life-stage approach to enhance overall well-being. Ensuring that the general population is made aware and has easy access to natural interventions can support women in coping with hormonal changes successfully.

Major Findings: The review reveals that stage-specific herbal and nutritional interventions significantly support women's hormonal, physiological, and psychological health from menarche to menopause. Nutrients and herbs like calcium, folate, omega-3s, *Shatavari*, and *Ashwagandha* promote balance, resilience, and overall well-being throughout women's life stages.

Keywords: Bone Health, Hormonal Balance, Medicinal Plants, Menarche, Menopause

Abbreviations: GnRH: Gonadotropin-Releasing Hormone; FSH: Follicle-stimulating Hormone; LH: Luteinizing Hormone; HPO axis: Hypothalamic–Pituitary–Ovarian Axis; PMS: Premenstrual Syndrome; PCOS: Polycystic Ovary Syndrome; CBT: Cognitive Behavioral Therapy; HT: Hormone Therapy; HRT: Hormone Replacement Therapy; SERMs – Selective Estrogen Receptor Modulators; EPA: Eicosapentaenoic Acid; DHA: Docosahexaenoic Acid; RBC: Red Blood Cell.

(Article Chronicle: Article Received on: 14.12.2025; Revised on: 04.03.2026; Accepted on: 10.03.2026)

1. Introduction

The journey of a woman's life from menarche to menopause represents a dynamic spectrum of physiological, hormonal, and psychological changes. Menarche, the onset of menstruation, marks the beginning of reproductive capability, while menopause, the permanent cessation of menstruation, signals the end of fertility[1]. These stages are profoundly influenced by hormonal fluctuations primarily involving estrogen

*Author for correspondence

and progesterone, which in turn have significant effects on metabolism, bone health, cardiovascular function, and overall well-being[2].

Throughout these phases, nutrition plays a pivotal role in supporting healthy development, managing symptoms, and preventing long-term health complications. Understanding and addressing these changing nutritional requirements is essential for promoting optimal health and quality of life across the female lifespan[3]. This review highlights the critical dietary considerations and interventions needed to support women from menarche to menopause, providing a foundation for both personal health and public health policy planning.

Menarche is defined as the first uterine bleeding, indicating the onset of menstrual function in females. It marks a biological milestone in adolescence, signifying readiness for reproductive capability. The average age of menarche typically ranges between 11 and 13 years, although occurrences in girls younger than 11 have also been reported. Menarche usually occurs during mid-puberty, a transitional phase from childhood to adulthood, characterized by rapid physiological and hormonal changes. Following puberty, women enter the reproductive phase, during which they are biologically capable of conceiving and bearing offspring[4].

The timing of menarche can be influenced by various factors, including genetics, nutrition, body fat percentage, physical activity, and overall health. Early or delayed menarche may indicate underlying health concerns such as hormonal imbalances or nutritional deficiencies[5].

Ensuring adequate nutrition for adolescent girls, particularly during menstruation, is vital for their physical growth, cognitive development, and overall well-being. The physiological demands of menstruation heighten the need for specific nutrients such as iron, calcium, vitamin D, magnesium, zinc, and vitamins B6 and E. Deficiencies in these essential nutrients can result in impaired physical development, cognitive deficits, increased vulnerability to infections, and long-term health complications, including osteoporosis. However, multiple challenges hinder optimal nutritional intake among adolescent girls. These include socio-economic constraints, cultural taboos, and limited access to nutritional education. Addressing these barriers requires a multi-faceted strategy involving education, policy reform, and community engagement. Effective interventions include school-based nutrition programs, public health initiatives, and awareness campaigns aimed at equipping girls and their families with the knowledge and resources to adopt healthier dietary practices. Policy-level measures such as subsidizing nutrient-rich foods, enhancing school meal programs, and fostering parental and community involvement are also critical. Collectively, these strategies aim to bridge nutritional gaps and promote the long-term health and productivity of adolescent girls[6].

Menstruation is the cyclic and orderly shedding of the endometrial lining, regulated by a complex interplay between the brain, ovaries, and uterus. This physiological process is driven by fluctuating levels of hormones originating from both the hypothalamus and the ovaries, with the uterus responding to these hormonal changes. The menstrual cycle begins in the hypothalamus, which secretes Gonadotropin-Releasing Hormone (GnRH). Gonadotropin-Releasing Hormone GnRH stimulates the anterior pituitary gland to release Follicle-Stimulating Hormone (FSH) and Luteinizing Hormone (LH). Follicle-stimulating hormone FSH promotes the development of ovarian follicles, which in turn produce estradiol, a key estrogen involved in endometrial proliferation. As estradiol levels rise, a surge in LH triggers ovulation and the release of a mature oocyte. Following ovulation, the ruptured follicle transforms into the corpus luteum, which secretes progesterone to prepare the endometrium for potential implantation. In the absence of fertilization and implantation, progesterone levels decline, leading to endometrial breakdown and menstruation. This finely tuned hormonal regulation also involves additional modulators from the central nervous system and the ovaries, which collectively ensure the proper timing and coordination of the menstrual cycle[7].

Menopause represents a major milestone in a woman's life, generally occurring between the ages of 46 and 55, and is marked by the end of menstrual cycles and a reduction in ovarian activity. This review offers an in-depth analysis of menopause from physiological, psychological, and social perspectives. It outlines the hormonal alterations, particularly the decline in estrogen and progesterone levels, and their role in triggering common symptoms such as hot flashes, sleep irregularities, and mood changes. The article also

discusses modern strategies for managing menopausal symptoms, including both lifestyle adjustments and therapeutic interventions, encompassing hormonal and non-hormonal options. By integrating recent scientific findings and clinical experience, this review seeks to improve awareness and provide guidance for both women undergoing this transition and the healthcare providers supporting them[8]. Common symptoms include hot flashes, night sweats, irregular periods, vaginal dryness, mood swings and sleep disturbances. Long-term effects may include osteoporosis, cardiovascular risk, and skin ageing due to lowered estrogen levels[9].

Psychologically, women may experience anxiety, depression, or emotional instability. Lifestyle modifications, balanced nutrition, regular exercise, and Hormone Replacement Therapy (HRT) (when appropriate) can help manage symptoms[10-13].

2. Materials and Methods

2.1 Sources of Information

An electronic literature search was conducted using three major databases: Google Scholar, Scopus, and PubMed. The key search terms included: "Women's health," "nutrition," "menarche," "menopause," and "medicinal plants". The search was specifically focused on studies related to the nutritional requirements of women from "menarche to "menopause".

2.2 Inclusion and Exclusion Criteria

The search was limited to articles published in English. The review strategy was specifically designed to explore the role of nutrition in women's health, with a focus on the transitional period from menarche to menopause. More than 200 key publications were initially screened,

Table 1. Nutritional and Herbal Support in Women's Health[14-30]

Common Name	Botanical Name	Key Nutrients and Phytoconstituents	Key Benefits
Soybean	*Glycine max*	Protein, Genistein, Daidzein	Mimics estrogen; eases menopause symptoms
Fennel	*Foeniculum vulgare*	Iron, Calcium, Anethole, Estragole	Relieves menstrual cramps
Fenugreek	*Trigonella foenum-graecum*	Iron, Protein, Diosgenin, Saponins	Supports menstrual health and lactation
Ashwagandha	*Withania somnifera*	Iron, Withanolides	Reduces stress; balances hormones
Shatavari	*Asparagus racemosus*	Saponins, Shatavarins	Supports fertility and menopause transition
Amla	*Phyllanthus emblica*	Vitamin C, Gallic acid, Tannins	Boosts immunity; antioxidant protection
Moringa	*Moringa oleifera*	Iron, Calcium, Vitamin A, Quercetin, Chlorogenic acid	Supports bone health; hormonal regulation
Spinach	*Spinacia oleracea*	Iron, Calcium, Zinc, Magnesium, Flavonoids, Glycosides	Prevents anaemia; promotes bone strength
Broccoli	*Brassica oleracea*	Vitamins C and K, Sulforaphane, Glucosinolates	Enhances immunity; supports eye and bone health
Sesame seeds	*Sesamum indicum*	Calcium, Protein, Sesamin (Lignans)	Maintains bone density in postmenopausal women
Coriander	*Coriandrum sativum*	Iron, Vitamin A, Linalool, Coumarins	Aids digestion; regulates menstrual cycles
Mint	*Mentha arvensis*	Vitamins, Minerals, Menthol	Soothes menstrual discomfort
Basil	*Ocimum sanctum*	Eugenol, Ursolic acid	Adaptogen: supports stress relief
Pomegranate	*Punica granatum*	Iron, Vitamin C, Punicalagin, Ellagic acid	Maintains hormonal balance
Avocado	*Persea americana*	Healthy fats, Phytosterols	Supports joint health; reduces pain severity
Curry Leaves	*Murraya koenigii*	Iron, Vitamins	Prevents anaemia; supports hair and hormonal health
Fig	*Ficus carica*	Calcium, Iron, Terpenoids, Tannins	Enhances bone strength

and only authentic, peer-reviewed research articles were considered for final inclusion.

2.3 Data Extraction

Data extracted included hormonal changes across the reproductive lifespan, the role of plant-based nutrition in women's health, and details of specific medicinal plants, including botanical names and phytochemical constituents. This enabled the synthesis of evidence-based insights on the nutritional and therapeutic value of plants from menarche to menopause.

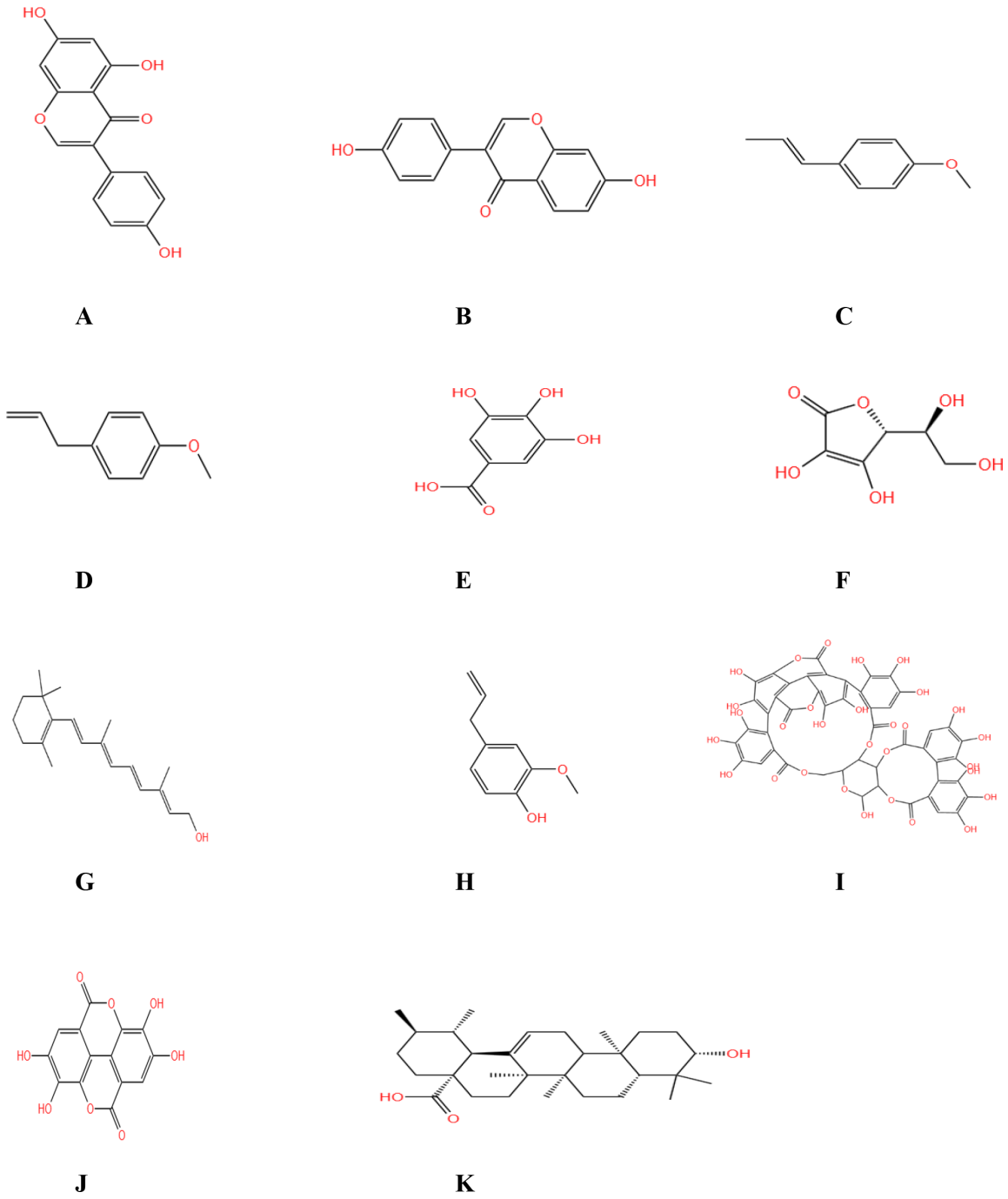


Figure 1. Chemical structures of key bioactive constituents: A = Genistein, B = Daidzein, C = Anethole, D = Estragole, E = Gallic acid, F = Vitamin C (Ascorbic acid), G = Vitamin A (Retinol), H = Eugenol, I = Punicalagin, J = Ellagic acid, K = Ursolic acid.

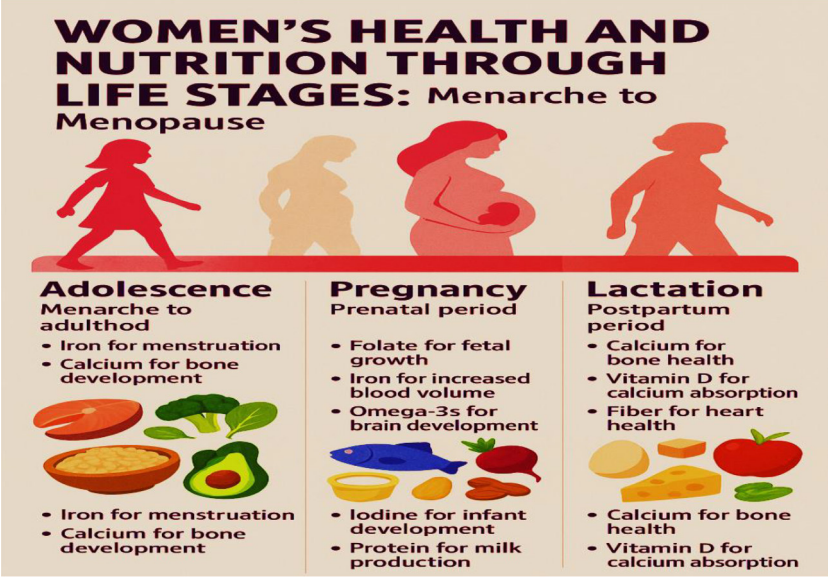


Figure 2. Women's health and nutrition through life stages.

Herbal and dietary interventions supporting women's health from menarche to menopause: A wide range of nutrient-rich foods and medicinal plants play a significant role in supporting women's health from menarche to menopause. The key bioactive compounds are listed in Table 1, and their corresponding chemical structures are illustrated in Figure 1.

3. How to Maintain and Prevent Health Issues in Women during Menarche to Menopause

The journey of womanhood spans several critical life stages from menarche (the onset of menstruation), through reproductive maturity, to menopause and beyond. Each phase brings with it a host of physiological, emotional, and hormonal changes that significantly impact a woman's health (Figure 2). Addressing these changes through preventive healthcare, nutritional strategies, lifestyle modifications, and emotional well-being is crucial for ensuring a high quality of life[31].

3.1 Menarche: Building the Foundation

Menarche, the onset of the first menstrual cycle, typically occurs between ages 10 and 15 and signifies the beginning of reproductive maturity. It is triggered by hormonal activation of the Hypothalamic-Pituitary-Ovarian (HPO) axis, leading to menstruation and development of secondary sexual characteristics such as breast growth, pubic hair, and height increase. While it marks a natural developmental milestone, menarche may also be accompanied by irregular cycles, menstrual cramps (dysmenorrhea), iron-deficiency anaemia, acne, and emotional fluctuations[32].

To support adolescent girls, preventive strategies are essential. Nutritional care should include iron-rich foods like leafy greens and dates to combat anaemia, along with calcium and vitamin D for bone health. Omega-3 fatty acids from walnuts and flaxseed can help reduce cramps and stabilise mood. Protein and B-vitamins aid in physical growth and hormonal regulation[33].

Menstrual hygiene education is equally important for girls to learn to use clean, safe sanitary products and maintain personal hygiene. Encouraging open discussions helps break societal taboos. Psychosocial support, including reassurance and emotional guidance, can ease mood swings and anxiety. Regular physical activity is also beneficial. Lastly, early medical screening helps identify abnormalities, ensuring timely care and a healthy transition into womanhood[34].

3.2 Reproductive Years: Optimising Health

The reproductive years, spanning from adolescence into the late 30s or early 40s, represent a phase of hormonal regularity and peak fertility. However, this stage often coincides with major lifestyle demands such as education, career development, relationships, and

family planning. Common health concerns include Premenstrual Syndrome (PMS), Polycystic Ovary Syndrome (PCOS), infertility, contraceptive-related issues, and stress-related hormonal imbalances[35].

Preventive strategies begin with balanced nutrition. A diet rich in whole grains, lean proteins, healthy fats, fruits, and vegetables supports hormonal stability and reproductive function. Folic acid is especially important for women planning a pregnancy. Adequate hydration and minimizing processed foods are also essential[36].

Hormonal health can be maintained through phytoestrogen-rich foods like soy and flaxseed. Women with Polycystic Ovary Syndrome (PCOS) benefit from a low glycemic index diet and regular exercise. Physical activity, 150 minutes per week of aerobic exercise, plus strength training, supports metabolism and bone health[37,38].

Reproductive planning should include safe contraceptive use and preconception counselling. Mental health care, including stress management and therapy, is vital for emotional well-being. Regular screenings, including Pap smears, breast exams, and checks for thyroid, blood pressure, and glucose levels, are critical. Together, these measures help optimise health during this pivotal stage of life[39].

3.3 Perimenopause: Navigating Hormonal Transition

Perimenopause is the transitional phase leading up to menopause. It is marked by fluctuating levels of estrogen and progesterone, resulting in irregular menstrual cycles and the onset of various menopause-related symptoms[40]. Common health concerns during this phase include hot flashes, night sweats, sleep disturbances, mood swings, memory lapses, fatigue, and weight gain.

Preventive strategies focus on managing hormonal changes through diet, lifestyle, and medical care. Nutritionally, it is essential to consume calcium-rich foods such as dairy, sesame seeds, and ragi to preserve

Table 2. Key Nutrients, Food Sources, and Health Benefits for Women[49-68]

Nutrient	Food Source	Key Benefit for Women
Calcium	*Ragi*, dairy	Bone strength, prevention of menopausal osteoporosis
Vitamin D	Sunlight, eggs, fortified milk	Calcium absorption, immune support
Folate	Leafy greens, citrus fruits	Cell division, neural tube development in pregnancy
Vitamin B12	Meat, eggs, dairy	RBC formation, nerve and ovarian health
Magnesium	Nuts, seeds, whole grains	Relieves PMS, bone and muscle function
Zinc	Pumpkin seeds, legumes	Immune support
Omega-3	Fish, chia seeds, flaxseeds	Infant development during pregnancy, anti-inflammatory, skin health, cancer prevention, and weight control
Vitamin C	Citrus, *amla*, bell peppers	Reduction in ovarian carcinoma risk
Vitamin A	Carrots, ripe mango, passion fruit	Eye, skin, reproductive health
Protein	Eggs, legumes, tofu	Tissue repair, hormone synthesis
Vitamin E	Almonds, sunflower seeds	PMS symptom relief, antioxidant
Isoflavones	Soy, tofu, miso	Menopause symptom relief, estrogen balance
Choline	Milk, meat, eggs	Brain development, pregnancy support
Biotin	Egg yolk, avocado, nuts	Hair, nail, and skin health
Vitamin K	Spinach, kale, broccoli	Bone mineralization, blood clotting
Selenium	Brazil nuts, fish	Antioxidant, thyroid support
Flavonoids	Citrus, tea, berries	Hormonal support, antioxidant
Lignans	Flaxseed, sesame	Phytoestrogenic activity for menopause
Tryptophan	Bananas, oats, turkey	Serotonin precursor, mood support
Lycopene	Tomatoes, watermelon	Potent antioxidant, supports breast health, may reduce risk of hormone-related cancers

bone health[41]. As vitamin D synthesis declines with age, supplementation is often necessary,[42] Omega-3 fatty acids help reduce inflammation and stabilize mood, while phytoestrogen-rich foods like soy, flaxseed, and lentils may ease hot flashes and support hormonal balance[43].

Lifestyle modifications such as maintaining a regular sleep schedule, reducing caffeine, alcohol, and spicy food intake, and engaging in regular physical activity can significantly improve quality of life[44]. Mind-body practices like yoga, meditation, and breathing techniques are beneficial in managing stress and vasomotor symptoms. Cognitive Behavioural Therapy (CBT) can aid in coping with mood disturbances[45].

3.4 Menopause and Postmenopause: Long-Term Health Focus

Menopause is clinically defined as the absence of menstruation for 12 consecutive months, typically occurring around age 50[46]. Postmenopausal women face increased risks of cardiovascular disease, osteoporosis, cognitive decline, and breast cancer due to estrogen deficiency. Hormone Therapy (HT) and Selective Estrogen Receptor Modulators (SERMs) can mitigate these risks. A balanced diet, regular exercise, screenings, and personalized treatment plans are essential for maintaining long-term health and independence[47]. Hormone Replacement Therapy may be considered for severe menopausal symptoms under medical supervision[48].

Table 2 highlights some essential nutrients from various foods that support women's bone health, hormonal balance, pregnancy, immune function, skin health, and chronic disease prevention across different life stages.

4. Results and Discussion

This review highlights the essential role of nutritional and medicinal plants in supporting women's health from menarche to menopause. Analysis of over 200 peer-reviewed studies revealed that each reproductive stage, menarche, reproductive years, perimenopause, and menopause presents distinct physiological and hormonal challenges that require stage-specific dietary and lifestyle interventions. Nutrient-rich foods such as leafy greens, dairy, and whole grains, alongside medicinal plants like soybean, *shatavari*, *ashwagandha*, and *amla*, were found effective in managing menstrual irregularities, hormonal imbalances, and menopausal symptoms. Plant-based phytoestrogens, antioxidants, and minerals were especially beneficial in mitigating estrogen deficiency-related concerns such as bone loss, mood disorders, and cardiovascular risks during perimenopause and post menopause.

The findings also emphasized the significance of early nutritional interventions during adolescence to build strong physical and mental health foundations. Preventive strategies, including iron and calcium supplementation, menstrual hygiene awareness, and education on hormone-friendly diets, are critical during this phase. Furthermore, lifestyle modifications such as regular exercise, stress management, and psychosocial support were shown to enhance the efficacy of nutritional therapies. The study underlines the need for integrated approaches combining traditional knowledge, modern research, and public health initiatives to effectively address the dynamic needs of women's health across their reproductive lifespan.

5. Conclusion

The menarche and menopause are key phases in the life of a woman that are characterized by complicated hormonal, physiological and psychological changes. This review presents the relevance of stage-related nutritional interventions and the therapeutic potential of medicinal plants in aiding the health of women in all reproductive stages. Proper consumption of important nutrients like iron, calcium, vitamin D, omega-3 fatty acids, and phytoestrogens, and herbal interventions like soybean, *ashwagandha*, *shatavari*, and *moringa* can assist in reducing menstrual disorders, reproductive illness, and menopause complications like osteoporosis and cardiovascular risk. Nutritional intervention earlier in adolescence provides a platform for future well-being, and prolonged dietary and lifestyle intervention in adulthood enhances healthy ageing.

Nevertheless, there are still substantial gaps in research. Some of the herbal interventions do not have large-scale, randomized clinical trials to prove efficacy, safety, standardization of dosage, and the long-term

effects. Evidence-based standardization of herbal formulations, longitudinal cohort studies during life stages, and integration of nutrition, phytotherapy and personalized medicine are areas that need to be examined in future research. It will be instrumental to enhance interdisciplinary research and implementation of strategies of public health, to maximize natural, available, and culturally relevant healthcare solutions to women across the world.

6. References

1. Forman MR, Mangini LD, Thelus-Jean R, Hayward MD. Life-course origins of the ages at menarche and menopause. Adolesc Health Med Ther. 2013; 4:1-21. https://doi.org/10.2147/AHMT.S15946
2. Steiner M, Dunn E, Born L. Hormones and mood: from menarche to menopause and beyond. J Affect Disord. 2003; 74(1):67-83. https://doi.org/10.1016/S0165-0327(02)00432-9
3. Harak SS, Shelke SP, Mali DR, Thakkar AA. Navigating nutrition through the decades: tailoring dietary strategies to women's life stages. Nutrition. 2025; 133:112736. https://doi.org/10.1016/j.nut.2025.112736
4. Jumiyati J. Factors related to age of menarche in adolescent women. Homes J Hosp Manag Stud J. 2022; 3(3):126-32. https://doi.org/10.24252/hmsj.v3i3.32463
5. Frisch RE. Body fat, menarche, fitness and fertility. Hum Reprod. 1987; 2(6):521-33. https://doi.org/10.1093/oxfordjournals.humrep.a136582
6. Hasan H, Ansari MT. Food and nutrition required for 8th class adolescent girls during their menstruation period. Int J Food Nutr Sci. 2023; 12(4):993.
7. Beshay VE, Carr BR. Hypothalamic-pituitary-ovarian axis and control of the menstrual cycle. In: Falcone T, Hurd WW, editors. Clinical reproductive medicine and surgery: a practical guide. 2nd ed. Cham: Springer International Publishing; 2017. p. 1-17. https://doi.org/10.1007/978-3-319-52210-4_1
8. Strelow B, O'Laughlin D, Anderson T, Cyriac J, Buzzard J, Klindworth A. Menopause decoded: what's happening and how to manage it. J Prim Care Community Health. 2024; 15:21501319241307460. https://doi.org/10.1177/21501319241307460
9. Bruce D, Rymer J. Symptoms of the menopause. Best Pract Res Clin Obstet Gynaecol. 2009; 23(1):25-32. https://doi.org/10.1016/j.bpobgyn.2008.10.002
10. Bauld R, Brown RF. Stress, psychological distress, psychosocial factors, menopause symptoms and physical health in women. Maturitas. 2009; 62(2):160-5. https://doi.org/10.1016/j.maturitas.2008.12.004
11. Gersh FL, Lavie CJ. Menopause and hormone replacement therapy in the 21st century. Heart. 2020; 106(7):479-81. https://doi.org/10.1136/heartjnl-2019-315898
12. Burger HG. Physiology and endocrinology of the menopause. Medicine (Abingdon). 2006; 34(1):27-30. https://doi.org/10.1383/medc.2006.34.1.27
13. Hale GE, Burger HG. Hormonal changes and biomarkers in late reproductive age, menopausal transition and menopause. Best Pract Res Clin Obstet Gynaecol. 2009; 23(1):7-23. https://doi.org/10.1016/j.bpobgyn.2008.10.001
14. Chen LR, Chen KH. Utilization of isoflavones in soybeans for women with menopausal syndrome: an overview. Int J Mol Sci. 2021; 22(6):3212. https://doi.org/10.3390/ijms22063212
15. Mahboubi M. Foeniculum vulgare as a valuable plant in management of women's health. J Menopausal Med. 2019; 25(1):1-14. https://doi.org/10.6118/jmm.2019.25.1.1
16. Akhtari E, Ram M, Zaidi SM, Marques AM, Rahimi R, Bahramsoltani R. Fenugreek (*Trigonella foenum-graecum* L.) in women's health: a review of clinical evidence and traditional use. J Herb Med. 2024; 43:100816. https://doi.org/10.1016/j.hermed.2023.100816
17. Abdelwahed MT, Hegazy MA, Mohamed EH. Major biochemical constituents of *Withania somnifera* (*ashwagandha*) extract: a review of chemical analysis. Rev Anal Chem. 2023; 42(1):20220055. https://doi.org/10.1515/revac-2022-0055
18. Banerjee P, Das A, Kumar P, Chakraborty S, Jalan K. An updated insight on the chemistry, ethnobotany, and health benefits of *Asparagus racemosus* (*Shatavari*): with a special emphasis on Shatavarin IV. J Am Nutr Assoc. 2025:1-12. https://doi.org/10.1080/27697061.2025.2496945
19. Talreja S, Kumari S, Srivastava P, Pandey S. A complete pharmacognostic review on amla. World J Pharm Pharm Sci. 2019; 8:622-637. https://doi.org/10.20959/wjpps20194-13486
20. Hairi HA, Jusoh RR, Sadikan MZ, Hasan WNW, Shuid AN. Exploring the potential of *Moringa oleifera* in managing bone loss: insights from preclinical studies. Int J Med Sci. 2025; 22(4):819-833. https://doi.org/10.7150/ijms.103241
21. Ibrahim IM, Oluchukwu NV, Salisu A, Nkemakonam OM. Nutritional and phytochemical analysis of spinach leaf aqueous extract: a comprehensive study on proximate composition, minerals, vitamins, and antioxidant activity. Eurasian J Sci Technol. 2025; 5(3):302-311. https://doi.org/10.48309/ejst.2025.495035.1199
22. Nagraj GS, Chouksey A, Jaiswal S, Jaiswal AK. Nutritional composition and antioxidant properties of fruits and vegetables. In: Academic Press. 2020; 5-17. https://doi.org/10.1016/B978-0-12-812780-3.00001-5
23. Arooj A, Rabail R, Naeem M, Goksen G, Xu B, Aadil RM. A comprehensive review of the bioactive components of sesame seeds and their impact on bone health issues in

postmenopausal women. Food Funct. 2023; 14(11):4966-4980. https://doi.org/10.1039/D3FO00531C
24. Nadeem M, Muhammad Anjum F, Issa Khan M, Tehseen S, El-Ghorab A, Iqbal Sultan J. Nutritional and medicinal aspects of coriander (*Coriandrum sativum* L.) A review. British Food Journal. 2013; 115(5):743-55. https://doi.org/10.1108/00070701311331526
25. Arshad MK, Fatima I, Ahmad W, Ellahi S, Mumtaz M, Akhtar MU, Aslam MS, Siddique WA. Mint (Mentha): a herb used as a functional ingredient. Sch Int J Tradit Complement Med. 2023; 6(3):38-52. https://doi.org/10.36348/sijtcm.2023.v06i03.003
26. Srivastava AK, Singh VK. Tulsi (*Ocimum sanctum*): a potent adaptogen. Clin Res Notes. 2021; 2(2):1-5. https://doi.org/10.31579/2690-8816/037
27. Cervantes-Anaya N, Azpilcueta-Morales G, Estrada-Camarena E, Ramírez Ortega D, Pérez de la Cruz V, González-Trujano ME, López-Rubalcava C. Pomegranate and its components, punicalagin and ellagic acid, promote antidepressant, antioxidant, and free radical-scavenging activity in ovariectomized rats. Front Behav Neurosci. 2022; 16:836681. https://doi.org/10.3389/fnbeh.2022.836681
28. Robin SJ, Balakumbahan R, Rajesh S, Muthulakshmi S, Anitha T. Exploring the bioactive components and their pharmacological prospects in avocado (*Persea americana* Mill.). Ann Phytomed. 2024; 13(2):394-407. https://doi.org/10.54085/ap.2024.13.2.38
29. Nandy SK, Das S. Unveiling the diverse medicinal properties of *Murraya koenigii*. Sci Phytochem. 2023; 2(2):211-225. https://doi.org/10.58920/sciphy02020107
30. Alzahrani MY, Alshaikhi AI, Hazzazi JS, Kurdi JR, Ramadan MF. Recent insight on nutritional value, active phytochemicals, and health-enhancing characteristics of fig (*Ficus carica*). Food Saf Health. 2024; 2(2):179-195. https://doi.org/10.1002/fsh3.12034
31. Steiner M, Dunn E, Born L. Hormones and mood: from menarche to menopause and beyond. J Affect Disord. 2003; 74(1):67-83. https://doi.org/10.1016/S0165-0327(02)00432-9
32. Zuchelo LT, Alves MS, Baracat EC, Sorpreso IC, Soares Jr JM. Menstrual pattern in polycystic ovary syndrome and hypothalamic-pituitary-ovarian axis immaturity in adolescents: a systematic review and meta-analysis. Gynecol Endocrinol. 2024; 40(1):2360077. https://doi.org/10.1080/09513590.2024.2360077
33. Kimothi S. Nutrition for reproductive age. In: Her health: essential nutrition for every stage of life. Part 1: foundations of nutrition and nutrition across the life stages. 2024. p. 59.
34. Joshi D, Buit G, González-Botero D. Menstrual hygiene management: education and empowerment for girls? Waterlines. 2015; 34(1):51-67. https://doi.org/10.3362/1756-3488.2015.006
35. Konforte D, Shea JL, Kyriakopoulou L, Colantonio D, Cohen AH, Shaw J, Bailey D, Chan MK, Armbruster D, Adeli K. Complex biological pattern of fertility hormones in children and adolescents: a study of healthy children from the CALIPER cohort and establishment of pediatric reference intervals. Clin Chem. 2013; 59(8):1215-1227. https://doi.org/10.1373/clinchem.2013.204123
36. Anderson K, Pauly K, Shapiro D, Dubovoy V. Optimal nutrition for women. In: Improving Women's Health Across the Lifespan. 2021:3-40. https://doi.org/10.1201/9781003110682-2
37. Verma MK, Singh BK, Tripathi M. Benefits of phytoestrogens. In: Herbs and Spices-New Perspectives in Human Health and Food Industry: New Perspectives in Human Health and Food Industry. 2024:109.
38. Cauley JA, Giangregorio L. Physical activity and skeletal health in adults. Lancet Diabetes Endocrinol. 2020; 8(2):150-162. https://doi.org/10.1016/S2213-8587(19)30351-1
39. Temitope OO. The significance of routine medical checkups on quality of life. Int J Med Nurs Health Sci. 2024; 5(6):31-46. https://doi.org/10.5281/zenodo.14604624
40. Santoro N. Perimenopause: from research to practice. J Womens Health (Larchmt). 2016; 25(4):332-339. https://doi.org/10.1089/jwh.2015.5556
41. Green SM, McCabe RE, Soares CN. The cognitive behavioural workbook for menopause: a step-by-step program for overcoming hot flashes, mood swings, insomnia, anxiety, depression, and other symptoms. Oakland (CA): New Harbinger Publications; 2012.
42. Gallagher JC. Vitamin D and ageing. Endocrinol Metab Clin North Am. 2013; 42(2):319-332. https://doi.org/10.1016/j.ecl.2013.02.004
43. Hechtman LN, Pizzorno JE. Naturopathic treatments for infertility and reproductive disorders. In: Pizzorno JE, editor. Nutrition, fertility, and human reproductive function. Elsevier. 2015; 309-336.
44. Yingngam B. Perimenopause: a dive into women's health. In: Utilising AI techniques for the perimenopause to menopause transition. IGI Global. 2024; 26-69. https://doi.org/10.4018/979-8-3693-2342-7.ch002
45. Hunter MS. Cognitive behavioural therapy for menopausal symptoms. Climacteric. 2021; 24(1):51-56. https://doi.org/10.1080/13697137.2020.1777965
46. Sherman S. Defining the menopausal transition. Am J Med. 2005; 118(12):3-7. https://doi.org/10.1016/j.amjmed.2005.11.002
47. Maximov PY, Lee TM, Jordan VC. The discovery and development of Selective Estrogen Receptor Modulators (SERMs) for clinical practice. Curr Clin Pharmacol. 2013; 8(2):135-155. https://doi.org/10.2174/1574884711308020006
48. McNagny SE. Prescribing hormone replacement therapy for menopausal symptoms. Ann Intern Med. 1999; 131(8):605-616. https://doi.org/10.7326/0003-4819-131-8-199910190-00010

49. Dube S, Varade S, Choudhari V. Utility of finger millet (ragi) in postmenopausal osteoporosis: a review. World J Pharm Res. 2024; 13:272-279. https://doi.org/10.20959/wjpr20246-31637
50. Pellegrino L, Marangoni F, Muscogiuri G, D'Incecco P, Duval GT, Annweiler C, Colao A. Vitamin D fortification of consumption of cow's milk: Health, nutritional and technological aspects. A multidisciplinary lecture on the recent scientific evidence. Molecules. 2021; 26(17):5289. https://doi.org/10.3390/molecules26175289
51. Orjuela MA, Titievsky L, Liu X, *et al.* Fruit and vegetable intake during pregnancy and risk for development of sporadic retinoblastoma. Cancer Epidemiol Biomarkers Prev. 2005; 14(6):1433-1440. https://doi.org/10.1158/1055-9965.EPI-04-0427
52. Obeid R, Heil SG, Verhoeven MM, van den Heuvel EG, de Groot LC, Eussen SJ. Vitamin B12 intake from animal foods, biomarkers, and health aspects. Front Nutr. 2019; 6:93. https://doi.org/10.3389/fnut.2019.00093
53. Mazza E, Maurotti S, Ferro Y, Castagna A, Pujia C, Sciacqua A, Pujia A, Montalcini T. Magnesium: exploring gender differences in its health impact and dietary intake. Nutrients. 2025; 17(13):2226. https://doi.org/10.3390/nu17132226
54. Majumdar A, Saraf SK, Sahu C, Pathak P, Baghel M. Zinc deficiency: impact on growth, immunity, and the role of plant-based nutritional strategies. Chem Biodivers. 2025; e00325. https://doi.org/10.1002/cbdv.202500325
55. Ahmad S, Ali MD, Khardali A, Ali MS, Khan G, Alam N, Thaibah H, Khatun A, Anwer T, Alam MS. Incredible use of omega-3 fatty acids: a review on current use and future perspective. J Young Pharm. 2024; 16(2):177-186. https://doi.org/10.5530/jyp.2024.16.24
56. Fairfield KM, Hankinson SE, Rosner BA, Hunter DJ, Colditz GA, Willett WC. Risk of *ovarian carcinoma* and consumption of vitamins A, C, and E and specific carotenoids: a prospective analysis. Cancer. 2001; 92(9):2318-2326. https://doi.org/10.1002/1097-0142(20011101)92:9%3C2318::AID-CNCR1578%3E3.0.CO;2-7
57. Nankumbi J, Grant FKE, Sibeko L, Mercado E, Kwikiriza N, Heck S, Cordeiro LS. Predictors of vitamin A-rich food consumption among women living in households growing orange-fleshed sweet potatoes in selected regions in Uganda. Front Public Health. 2023; 10:880166. https://doi.org/10.3389/fpubh.2022.880166
58. Kim K, Yisahak SF, Nobles CJ, Andriessen VC, DeVilbiss EA, Sjaarda LA, Alohali A, Perkins NJ, Mumford SL. Low intake of vegetable protein is associated with altered ovulatory function among healthy women of reproductive age. J Clin Endocrinol Metab. 2021; 106(7):e2600-e2612. https://doi.org/10.1210/clinem/dgab179
59. Bahrami A, Bahrami-Taghanaki H, Khorasanchi Z, Timar A, Jaberi N, Azaryan E, Tayefi M, Ferns GA, Sadeghnia HR, Ghayour-Mobarhan M. Menstrual problems in adolescence: relationship to serum vitamins A and E, and systemic inflammation. Arch Gynecol Obstet. 2020; 301(1):189-197. https://doi.org/10.1007/s00404-019-05343-1
60. Messina M. Soy foods, isoflavones, and the health of postmenopausal women. Am J Clin Nutr. 2014; 100(1):423S-430S. https://doi.org/10.3945/ajcn.113.071464
61. Zeisel SH. Nutrition in pregnancy: the argument for including a source of choline. Int J Womens Health. 2013; 5:193-199. https://doi.org/10.2147/IJWH.S36610
62. Kannan S, Balakrishnan J, Nagarajan P. Vitamin B7 (Biotin) and its role in hair, skin and nail health. In: Hydrophilic Vitamins in Health and Disease. Cham: Springer International Publishing; 2024; 233-52. https://doi.org/10.1007/978-3-031-55474-2_10
63. Mahajan P, Katoch S. Vitamin K: a micronutrient with new perspectives. Int J Sci Res Sci Technol. 2022; 9(4):424. https://doi.org/10.32628/IJSRST229468
64. Gorini F, Sabatino L, Pingitore A, Vassalle C. Selenium: an element of life essential for thyroid function. Molecules. 2021; 26(23):7084. https://doi.org/10.3390/molecules26237084
65. Wang Y, Liu XJ, Chen JB, Cao JP, Li X, Sun CD. Citrus flavonoids and their antioxidant evaluation. Crit Rev Food Sci Nutr. 2022; 62(14):3833-3854. https://doi.org/10.1080/10408398.2020.1870035
66. Shanmugaloga S, Shilpa PN. Phytoestrogens: unlocking the power of plant-based estrogens. J Ayurveda Integr Med Sci. 2024; 9(6):164-174. https://doi.org/10.21760/jaims.9.6.25
67. Nayak BN, Singh RB, Buttar HS. Biochemical and dietary functions of tryptophan and its metabolites in human health. In: Singh RB, ed. Functional Foods and Nutraceuticals in Metabolic and Non-Communicable Diseases. Academic Press. 2022; 783-798. https://doi.org/10.1016/B978-0-12-819815-5.00003-3
68. Przybylska S. Lycopene-a bioactive carotenoid offering multiple health benefits: a review. Int J Food Sci Technol. 2020; 55(1):11-32. https://doi.org/10.1111/ijfs.14260

Authors Contribution

Bhawana Bhatt - Writing: Original draft preparation and Conceptualisation; Sudhakar Kaushik - Conceptualisation and Supervision; Mohit Sanduja - Verified the content of the manuscript with the article and cited references throughout the manuscript; Madhuri Grover - Review and Editing; Nishan Singh - Collected all relevant articles and assisted us in every process. All authors have read and agreed to the published version of the manuscript.