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Review Article

Effect of Dietary Supplements In Women's Health Across the Life Cycle: A Nutraceutical Perspective

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ABSTRACT:

Women health is dynamic and it is affected by the changes in hormones, metabolism and lifestyles in the life cycle life cycle such as adolescence, reproductive years, menopause, and old age. Nutraceuticals/ Dietary supplements are assuming a highly essential role in closing nutritional gaps that might exist as a result of physiological requirements, inadequacy in nutritional habits, or constant stress. Adolescents are prone to iron, calcium, vitamin D, and folate deficiency that may also have an impact on growth and reproductive well-being. At the reproductive age, omega-3 fatty acids, probiotics, and antioxidants aid fertility, hormonal equilibrium, and immunity. Pregnancy raises the need of micronutrients like folic acid, iron, Iodine and DHA in the growth of the fetus and in the health of the mother. Menopause Menopause has been shown to respond to calcium and vitamin D, as well as phytoestrogens and herbal adaptogens, which help to determine hormonal changes and bone density.

Nevertheless, over-supplementation, low quality, or self-medication complicate this situation and cause toxicity, metabolic disorders, and interactions between drugs and nutrients. Misinformation and socioeconomic barriers are also other conditions that contribute to the improper usage. Clinically directed nutraceutical interventions, in combination with a personalized nutritional assessment, have the potential to lead to a major improvement of the quality of life, decrease the risk of chronic diseases, and healthy aging. The evidence-based review of the use of supplements in the maintenance of women health at all stages of life has been identified and viable points given to be used safely and effectively in nutraceuticals with professional advice.

Keywords: Women health, nutraceuticals, dietary supplements, life cycle, hormonal balance, menopause, micronutrients, pregnancy nutrition, preventive healthcare.

INTRODUCTION

Dietary supplements may be generally defined as any product (except tobacco) that contains one or more of either vitamins or minerals, phytochemicals as well as amino acid, herbs, or other botanical substances and is promoted as being useful in supplementing the nutritional value of a diet [1,2]. According to the National Diet and Nutrition Survey of the British Adults, 17 percent of the female population attempted using dietary supplements. Women, unlike men, undergo certain physiological, hormonal and metabolic changes during their lives, that is, during adolescence and old age [3]. The process of the female life cycle has a very specific nutritional need which is required to ensure the health, fertility and well-being. There is a need to think of the various phases of women health, such as infancy, adulthood, the preconception phase, pregnancy phase and the lactating phase to mitigate the risk of pregnancy-related complications and deaths and eradicate the disparities by promoting health and preventing diseases. Nevertheless, women do not apply all these nutritional needs to dietary components due to lifestyle and stress, as well as subpar dietary behaviours [4].

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Being over-the-counter medicines, dietary supplements are crucial in sealing these nutritional deficiencies, and one does not need a prescription to use them. They contain supplements - vitamins, minerals, carotenoids, omega 3 fatty acids and probiotics which aid in maintaining hormonal balance, bone quality and energy metabolism [5]. Vitamin complexes, iron, lycopene, omega-3 fatty acids are key nutrients that play significant roles in various body systems and thus, play a vital role in ensuring that a person has optimum health [6,7,8]. Clinical tests on animals or in vitro must be carried out as a requirement in the pharmaceutical industry to verify the effects of a compound. Quite the contrary, in nutrition, there used to be no such mechanism of the past to verify the effects of foods to prevent or treat illnesses. The food composition has however been scientifically experimented and confirmed in recent years as people are becoming increasingly concerned about health-related problems and how food can be directly or indirectly responsible to keep one in good health and prevent diseases (Figure 1) [9,10]. Menopause is linked with extreme rates of obesity, metabolic syndrome, heart disease, and osteoporosis. Nutraceutical medicine now has been recognized as accepted in Various Diseases as a component of a part of Complementary and Alternative Medicine (CAM) and, consequently, accepted within the new branch of CAM [12,13].

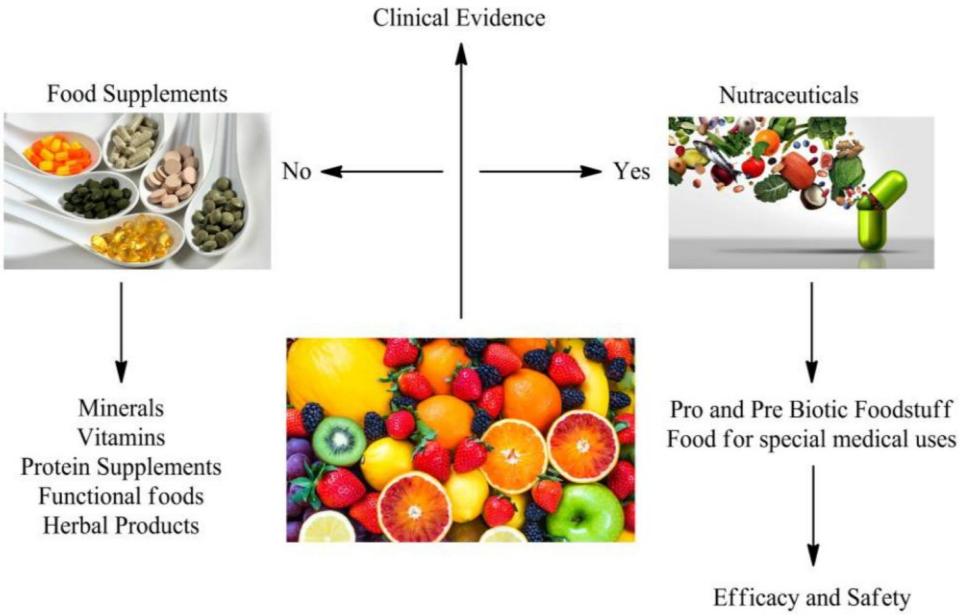

Figure 1. Potential roles of nutraceuticals.

Nevertheless, the proposed review intends to investigate and examine how dietary supplements affect physiological processes and general health of women across the life cycle.

Dietary Supplements are classified as either:

Categorization of dietary supplements in terms of nutrients, composition, source and regulation. Figure 2 prepared using more than one source (Figure 2) [14-18];

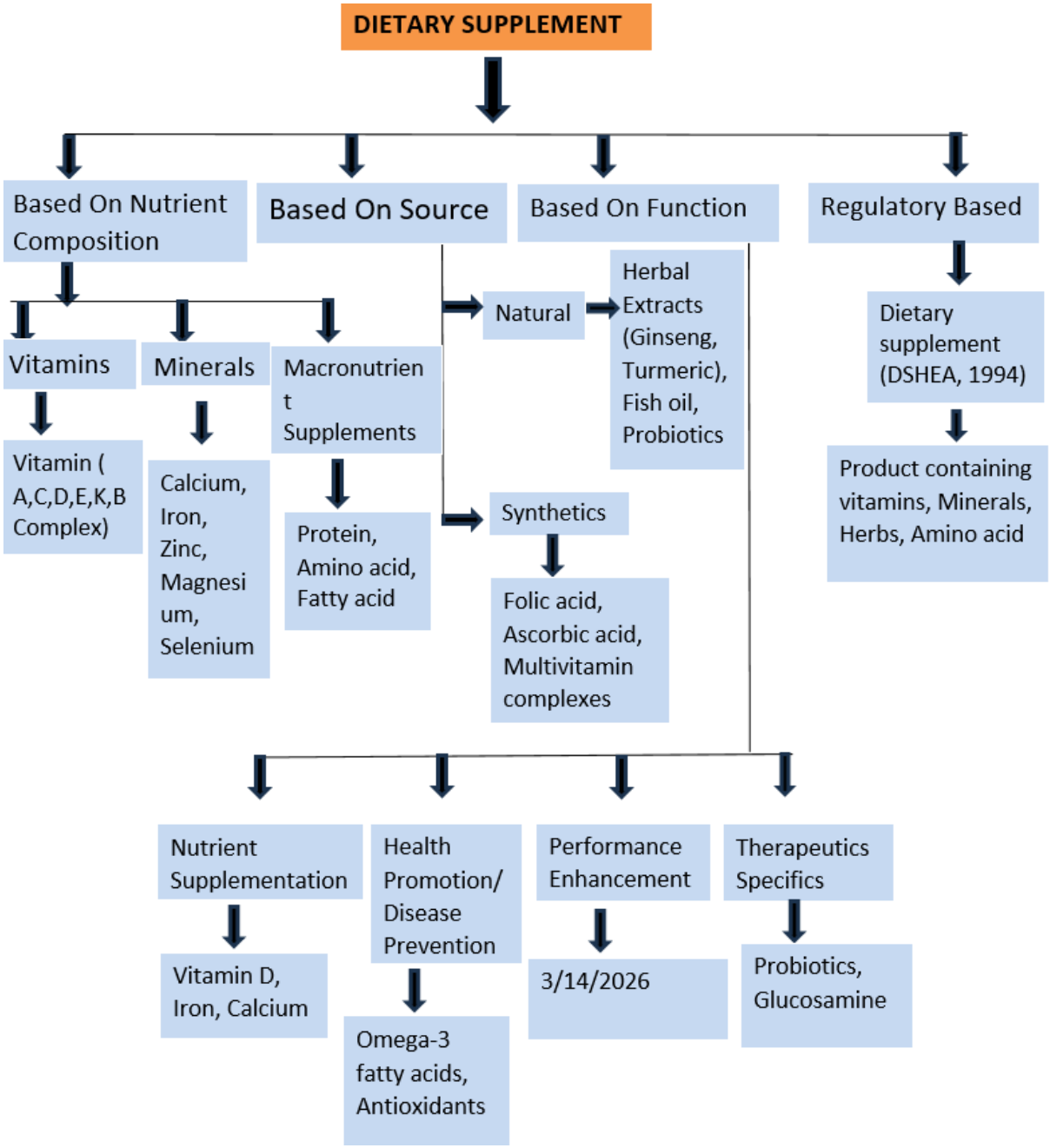

Figure 2. Classification of dietary supplements

2.1 On the Basis of Nutrient Composition:

Vitamins:

Vitamins can be utilized as nutraceuticals because of their antioxidant properties, and could play a big role in the maintenance of human health.

Functions: Control metabolism, antioxidant defence, and immune support [14,15].

Minerals:

Inorganic minerals are a part of elements that are necessary in a number of physiological and biochemical processes in the human body.

Functions: bone, enzymatic functions, Oxygen transport, thyroid gland functioning, and diabetes, wound healing [14,15].

Macronutrient Supplements:

The main nutritional elements needed by the human body in great quantities are the macronutrients.

Functions: Mends the muscles, metabolism of energy, and augmented physiological demands during pregnancy and aging [16].

2.2 Based On Source

Natural:
Natural dietary supplements refer to products that are produced in a natural form by plants, animals, and microorganisms to aid in supplementing or nutritional intake towards the overall health.
Functions: Anti-inflammatory, anti-oxidant, hormonal, and reproductive support [15,16].
Synthetics:
Synthetic dietary supplements refer to artificial preparations that are composite manmade likenesses formulated to deliver definite nutrients or bioactive substances synthesized in labs.
Functions: Prevent pregnancy, lactation, and hormontropically synthesize chemicals preventing deficiency related disease.

2.3 Based On Function:

Nutrient Supplementation:
Nutrient supplementation is the process of ensuring that physiological processes are at their best level, avoid deficiencies, and enhance health in general.
Functions: normalize the nutritional deficiencies, prevent the chronic disease, and reserve the metabolic functions [14,17].
Health Promotion/Prevention of Disease:
These nutritional supplements contain vitamins, minerals, amino acids, herbs, probiotics, and bioactive products and are beneficial in regulating the physiological processes and preventing the development of chronic diseases.
Functions: Cardiovascular and immune support [15,17].
Performance Enhancement:
Functions: enhance endurance, muscle similar performance [17].
Therapeutic Specific:
Functions: Is a gut and joint antagonist.

2.4 Regulatory Classification:

Dietary supplement (DSHEA,1994):
Use: not food supplements regulate like drugs.

Nutritional Requirement through the Life Cycle:

3.1 Adolescence

The nutrient needs are augmented by rapid growth, the beginning of the menstrual cycle, and hormonal fluctuations.
Major Nutrients: Iron, folate, calcium, vitamin D and zinc.
Nutraceutical Role Forts and Supplements Fortified foods and supplements aid in prevention of anemia, bone mineralization, and cognitive health.
Ordinary Problems: Deficiencies are caused by missing meals, body image problems, and eating fast-foods.

3.2 Reproductive Years

Stress, eating disorders and use of contraceptives has interference with the absorption of micronutrients.
Important Nutrients: B-complex vitamins, magnesium, omega-3 fatty acids, probiotics.
Benefits: Enhances fertility, regular menstrual periods, skin and mood stability.
Complications: Metabolic disturbances may occur as a result of excessively using herbal fertility boosters or hormonal supplements without medical recommendations.

3.3 Pregnancy and Lactation

The requirements of nutrients are enormous due to fetal development and lactation.
Major Supplements: Folic acid, Iron, Calcium, Iodine, DHA, and vitamin B 12.
Advantages: It helps to prevent neural tube defect, anemia, and it aids brain and skeletal development.
Difficulties: Morning sickness, low socioeconomic status (low socioeconomic support), and lack of food tolerance complicates the intake of food.

3.4 Menopause and Postmenopausal Stage.

The decrease in hormones results in the decreased bone mass and enhanced oxidative stress.
Nutraceutical Support: Calcium, vitamin D, magnesium, soy isoflavones, black cohosh and phytoestrogens.
Proprieties: Decreases the amount of hot flushes, mood fluctuations, and osteoporosis.
Complications: Unregulated use of phytoestrogens can change the functioning of thyroid or liver.

Popular Complications and Issues Encountered:
Excessive supplementation: Toxicity of fat-soluble vitamins (A, D, E, K).
Poor quality of the product: Adulteration and contamination of unregulated supplements.
Drug-nutrient interactions: Supplements that affect contraceptives or thyroid drugs.
Economic and educational issues: Low awareness regarding dosage and need.
Misinformation: Trends that encourage unsafe products in the social media.

Dietary Supplements at various point of time of pregnancy:

During different stages of pregnancy, the nutritional needs differ and the summary of dietary supplements necessary to the maternal and fetal health. Table derived using various source (Table 1) [39-42].

Table 1. Dietary Supplements during Different Stages of Pregnancy

Stage	Goal/Physiological Focus	Key Supplements	Functions/Importance
Preconception (Before pregnancy)	Prepare the body for conception and early fetal development	Folic acid(400-800µg/day), Iron, Calcium and Vitamin D, Omega-3(DHA), Iodine	Prevents neural tube defects, Builds iron stores for pregnancy, Supports bone health and fertility, Promotes brain and eye development, Regulates thyroid function.
First Trimester (0-13 weeks)	Organ formulation and neural tube closure	Folic acid(continue), Iron, Vitamin B6, Vitamin D, Iodine	Prevents neural tube defects, Supports blood formation, Reduces nausea and fatigue, Boosts immunity, Aids early brain development
Second Trimester (14-27 weeks)	Rapid fetal growth, bone and muscle development	Iron(27mg/day), Calcium(1000mg/day), Vitamin D (600 IU/day), Omega-3(DHA 200-300mg/day), Magnesium and zinc	Prevent anemia, Strengthens fetal bones and teeth, Support calcium absorption, Aids brain and eye development, Helps tissue and enzyme functions
Third Trimester (28-40 weeks)	Final fetal growth, brain and lung maturation	Iron, Calcium and vitamin, Omega-3(DHA), Vitamin C, B-Complex vitamins	Prevents anemia, Supports bone mineralization , Enhances brain and retina development, Improves iron absorption and immunity, Reduces maternal fatigue
Postpartum/ Lactation (After Birth)	Maternal recovery and breast milk nutrition	Iron, Calcium and Vitamin D, Omega-3(DHA),Vitamin B12, Iodine	Replenishes lost iron, Maintains bone strength, Supports baby's brain and eye development via milk, Enhances maternal energy, Regulates thyroid and metabolism

Therapeutic Place in women health disorder:

The dietary supplements serve as relevant aids in the care and prevention of female health diseases. They have a curative effect in restoring the nutritional balance, hormonal regulation, boosting immunity and antioxidant defenses. Clearly, dietary supplementation has become effective in the following areas.

6.1 Polycystic Ovary Syndrome (PCOS): PC is a hormonal disorder characterized by insulin resistance. Myo-inositol and vitamin D enhance insulin sensitivity, recuperate ovulation, and menstrual cycles. The Omega-3 fatty acids reduce the levels of androgens and cytokines, which cause inflammation, enhancing metabolism and reproductive performance [43,44].

6.2 Premenstrual Syndrome (PMS): Vitamin B6, magnesium and calcium shortages have a role to play in the symptoms of the PMS. Supplementation improves the production of serotonin, lessens muscle cramps, as well as stabilizes the mood, eliminating physical and emotional pain at the luteal phase [45].

Bone Health An equal drop of soy isoflavones, which bind to estrogen receptors, helps with the prevention of hot flashes as well as bone density during menopause. Calcium and vitamin D keep the bones hard and prevent osteoporosis and vitamin K2 helps in the use of calcium [46,47].

6.3 Iron-Deficiency Anemia and Pregnancy: Iron, folic acid and vitamin B12 play an important role in the formation of red cells and the development of a fetus. Combine supplementation aids the prevention of anemia, neural tube defects and fatigue in the pregnant mothers during pregnancy and lactation [48].

6.4 Thyroid and Metabolic Disorders: Micronutrients such as iodine, selenium, and zinc aid in the synthesis and the frequency of thyroxine (T4) into triiodothyronine (T3). Constant usage keeps thyroid activity and oxidative stress low in hypothyroid women [49].

6.5 Mental and Emotional Health: B-complex vitamins, magnesium, and omega-3 fatty acids improve the production of neurotransmitters, which improve the stress, anxiety, and fatigue. Resilience in adaptogenic herbs, like ashwagandha, is achieved through stabilizing the hypothalamic-pituitary-adrenal (HPA) axis [50].

6.6 Cardiovascular Disorders: When postmenopausal women lose estrogen the risk of cardiovascular disease rises. Omega3 fatty acids (EPA/DHA) lower triglycerides and inflammation and Coenzyme Q10 enhances energy production in the mitochondrion and endothelial activity [51]. Vitamin B6 and folic acid reduce the level of homocysteine causing vascular damage [52].

The use of Nutraceuticals to add value to women:
Increase immunity and metabolism.
Stabilize hormones and decrease PMS or menopause pain.
Until reproductive and maternal health is promoted.
Avert osteoporosis, anemia and cardiovascular diseases.
Delay aging with antioxidant effect.

Healthy Living and Active Use of Supplements:
Individualized nutrition: Frequent evaluation of nutrients.
First: Balanced diet Supplements cannot substitute food.
Certified products: Select the products that are purified and effective.
Professional advice: Resort to a dietician or a physician.
Lifestyle support: Add activity, getting enough of these fluids, managing stress, and go to bed.

CONCLUSION

Between teenage and menopause, there are distinct nutritional needs that have been influenced by biology and lifestyle in women. Nutraceuticals can be scientific and preventative to health in moderation. It is mandatory to employ education, professional counseling, and quality control to enable them to realize their full potential. An integrated diet, nutrition combined with supplementation, and lifestyle can enable women to live healthier and more vibrant lives at any age.

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