



Growing usage of nutraceuticals in India: Advantages and limitations

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Abstract

The usage of nutraceuticals has experienced rapid growth over the last decade, driven by increasing health awareness, rising lifestyle disorders, urbanization, and digital health marketing. Aligning with the concept of “prevention is better than cure”, nutraceuticals are the products that provide physiological health benefits beyond basic nutrition. It includes dietary supplements, functional foods, fortified products, herbal extracts, and probiotics. In one hand their growing usage offers lots of preventive health care support and economic growth, but in the other hand it also raises concerns regarding safety, affordability, and scientific validation. This article critically examines the drivers behind the rising consumption of nutraceuticals in India and evaluates their advantages and limitations within the broader public health and regulatory framework.

Keywords: Nutraceuticals, functional foods, prebiotic, probiotic

Introduction

The term “nutraceutical” is derived from the word’s “nutrition” and “pharmaceutical” and initially developed by Dr. Stephen DeFelice, in 1989. Nutraceuticals are regulated as foods containing extracts, isolates, or purified compounds that provide physiological benefits and help in maintaining health. They are classified based on their ingredients and application. Nutraceuticals offer health benefits beyond basic nutrition and act as preventive shields against lifestyle-related and age-related diseases. These are available in market in various consumable forms such as capsules, tablets, drinks, or fortified foods.

In India, with growing economy and increasing cases of non-communicable and life style diseases, there is unprecedented demand for nutraceutical products. With rising health awareness, people have become health conscious, and they seek solutions to various chronic diseases like cardiovascular diseases, diabetes, etc. In 2024, the Indian nutraceuticals market was estimated to be 8-8.8 billion dollar, and it is forecasted to reach 21.5 billion dollars by 2033. Nutraceuticals are generally considered safe to consume when taken under supervision of doctors, but potential risks exist, particularly with excessive consumption or interactions with other substances. Though nutraceuticals offer potential health benefits, it is crucial to know the safety and regulatory aspects.

Types of Nutraceuticals

As per FSSAI (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Functional Food and Novel Food) Regulations 2016, updated in 2022 and 2024 classify food supplements in to various categories such as:

- 1. Nutraceuticals (as per Schedule VI):** Purified substances or extracts from plants, animals, or microorganisms.
- 2. Health Supplements:** Concentrated sources of nutrients (vitamins, minerals, amino acids, botanicals) to supplement the diet. Health supplements are intended to supplement the normal diet of a person with one or

more nutrients with known benefits. These are divided further into two categories:

- Foods for special dietary use (FSDU) are specially processed or formulated to satisfy dietary requirements for specific ailments.
 - Foods for special medical purposes (FSMP) are intended for exclusive or partial feed to people with digestive issues.
- 3. Functional Foods:** Foods containing added ingredients that provide enhanced health benefits beyond basic nutrition.
 - 4. Probiotics (Schedule VII):** Beneficial live microorganisms.
 - 5. Prebiotics (Schedule VIII):** Non-digestible food ingredients that stimulate probiotic growth.
 - 6. Botanicals (Schedule IV):** Ingredients derived from plant. Phytochemical is also alternatively term that refers to a variety of plant-derived compounds with therapeutic activities such as anticarcinogenic, antimutagenic, anti-inflammatory, and antioxidant properties (McGuire, 2011)

Usage of Common Nutraceuticals in Preventive Healthcare

Nutraceuticals bridge the nutritional gaps and help to reduce the risk of chronic diseases such as diabetes, cardiovascular disorders, obesity, arthritis, and osteoporosis. It also supports immunity, gut health, cognitive function, and healthy aging. Nutraceuticals can be easily incorporated into daily life without major dietary changes. They have fewer side effects as many are derived from natural or food-based sources. Nutraceuticals commonly consumed for various health issues such as-

Cardiovascular Health: Omega-3 fatty acids extracted from fish oil and flaxseed oil helps to lower triglycerides, reduce inflammation, protect against heart disease. Plant

sterols & stanols also helps to lower LDL cholesterol. Coenzyme Quercetin helps to reduce oxidative stress, supports heart muscle function, may reduce blood pressure and support respiratory health.

Metabolic & Diabetes Management: Fiber supplements like psyllium, inulin, beta-glucans improve glycemic control and reduce cholesterol. Cinnamon, fenugreek, improve insulin sensitivity. Chromium picolinate aids glucose metabolism.

Bone & Joint Health: Calcium, Phosphorous, Vitamin D prevent osteoporosis. Magnesium & Vitamin K2 enhance bone mineralization. Collagen peptides & glucosamine support joint flexibility and reduce arthritis risk.

Gut & Digestive Health: Probiotics like Lactobacillus bacteria, Bifidobacterium maintain healthy gut flora, prevent diarrhea and IBS. Prebiotics like Fructo-oligosaccharides, inulin etc. feed beneficial bacteria, improve digestion. Herbal extracts like aloe vera, peppermint oil support digestive comfort.

Immunity & Infections: Vitamin C, Vitamin E, Zinc, Selenium boost immune response, reduce oxidative stress. Curcumin extracted from turmeric is anti-inflammatory and antioxidant. Whereas Ashwagandha, Tulsi, Giloy enhance immune resilience.

Brain & Cognitive Health: Omega-3 (DHA) supports brain development and reduces risk of neurodegeneration. Ginkgo biloba may improve memory and circulation. B vitamins (B6, B12, folate) reduce homocysteine levels linked to cognitive decline.

Healthy Aging & Cancer Prevention: Antioxidants like resveratrol, lycopene, polyphenols, green tea extract protect against oxidative stress and DNA damage. Vitamin D & Calcium reduce risk of osteoporosis and fractures in elderly. Soy isoflavones may reduce risk of hormone dependent cancers like breast cancer.

Skin & Eye Health: Carotenoids like lutein, zeaxanthin, beta-carotene protect against age-related macular degeneration. Collagen peptides, hyaluronic acid support skin elasticity and hydration. Vitamin E & C protect against photoaging.

Agencies Regulating Nutraceuticals Usage in India & World

Nutraceuticals are regulated by various national and international agencies to ensure safety and appropriate labeling. Ensuring that nutraceuticals are safe for consumption is a primary concern for all regulatory bodies. It includes assessing potential risks associated with ingredients, manufacturing processes, and product claims.

Food Safety and Standards Authority of India (FSSAI):

FSSAI regulates nutraceuticals through the Food Safety and Standards (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Functional Food and Novel Food) Regulations, 2016, with subsequent amendments and directives that have been re-

operationalized (including draft 2022) to govern this category. Nutraceuticals under FSSAI are defined as foods that provide a physiological benefit and help maintain good health, but are not intended to diagnose, treat, cure or prevent any disease.

As per FSSAI, nutraceuticals are treated as food, not drugs, hence therapeutic claims are not permitted on labels. The ingredients specified in FSSAI schedules VI can be used. Ingredients must comply with quality, purity and standardization criteria specified in the regulations. If a nutraceutical ingredient is not listed in the schedules but has a safety history, it requires prior FSSAI approval with scientific documentation (15 years usage in India or 30 years abroad). The nutrient levels in a nutraceutical must not exceed recommended daily allowances (RDA) as specified by the Indian Council of Medical Research (ICMR). FSSAI has specific labeling requirements. Mandatory Label Elements are

- Must display the term “NUTRACEUTICAL” prominently
- Ingredient list with quantity and physiological effect
- If present, nutrient amount as % of RDA
- Must mention the statement “NOT FOR MEDICINAL USE”
- Advisory warnings (e.g., risk of excessive consumption, keep away from children)
- Clear instructions and precautions must be given

All nutraceutical products must be licensed and registered with FSSAI before manufacture and sale. Products outside the existing schedules need prior scientific approval from FSSAI. FSSAI conducts enforcement and compliance checks; non-compliant products are removed from the market.

United States Food and Drug Administration (USFDA):

The FDA regulates dietary supplements, which often include nutraceuticals, under the Dietary Supplement Health and Education Act of 1994 (DSHEA). This act focuses on ensuring the safety of these products. WHO (World Health Organization) in collaboration with FAO (Food and Agriculture Organization) formed Codex Alimentarius Commission, which plays a crucial role in setting international standards and develops global guidelines to ensure fair practices in the food trade.

Factors Contributing to Growing Usage of Nutraceuticals in India

There are various socio-cultural, technological and environmental factors contributing to the growing usage of nutraceuticals in India

1. Preventive, Personalized & Functional Nutrition:

After Covid pandemic there is a shift toward prevention first approach which gave impetus to taking supplements for various health needs like improving immunity, metabolism, cognition, and hormonal balance, etc.

2. Digital Awareness: Nowadays people are aware through social media and becoming health conscious. Personalized nutrition, powered by AI and biomarker insights, is gaining grip among tech-savvy, wellness-focused consumers.

3. **Strong supply infrastructure & MSME contributions:** India's status as a major producer of botanicals and active ingredients, combined with cost-competitive manufacturing and regulatory-approved plants, make it a global manufacturing hub.
4. **Research & Biotechnology Integration:** The govt. of India establishing various research institutions like Centre of Innovative and applied Bioprocessing (CIAB), Mohali focus on turning agricultural residues into nutraceutical products. The Central Marine Fisheries Research Institute is developing seaweed-derived nutraceuticals targeting diabetes, obesity, and rheumatic conditions.
5. **The Academia-Industry:** collaborations are also given necessary impetus by Indian Higher educational institutions. They are driving sustainable delivery of sensitive bioactive like peptides, herbal extracts, vitamins enabling clean-label and targeted nutraceutical formulations. States are establishing Centers of Excellence, such as Kerala's nutraceutical hub in 2024, strengthening regional innovation ecosystems.
6. **Government Support & Regulatory Initiatives:** The FSSAI is refining guidelines, while the CSIR's Nutraceutical Task Force introduced classification codes, PLI schemes, and export incentives under the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme by the Government of India, launched on January 1, 2021, to boost exports by making Indian products competitive in global markets.
7. **Popularity for Indian traditional products:** Natural ayurvedic products like fortified juices, energy drinks, herbal infusions are experiencing strong demand, due to India's heritage and consumer preference for purity.
8. **Product Formats and Accessibility:** Nutraceuticals are made available in chewable Gummies, and Lozenges in easily consumable form. They are gaining favor over traditional pills across age groups.

Risks Involved in Usage of Nutraceuticals

Nutraceuticals are increasingly used for various purposes, for prevention of chronic lifestyle diseases or to delay use of medicine. There is certain risk involved in the consumption of nutraceuticals that need to be addressed carefully.

Excessive Consumption: Consumption of certain nutraceuticals are generally considered safe at dietary levels, high doses of nutraceuticals can pose risks, potentially leading to hyperchromatosis toxicity or adverse effects. For example, excessive iron intake can lead to liver injury. Taking appropriate dose of vitamin D is generally considered safe, but high doses may lead to fragile bone and fractures. Resveratrol is generally used for anti-inflammatory properties, generally considered safe but high doses or prolonged use may have toxic effects.

Industrial Contamination: Manufacturing processes can introduce contaminants like pesticides, heavy metals, and toxic chemicals, impacting safety.

Drug Interactions: Nutraceuticals can interact with medications or other supplements, potentially affecting their efficacy or increasing the risk of adverse effects. Calcium supplements can cause gastrointestinal issues, increase the risk of kidney stones, and potentially increase the risk of heart attacks.

Lack of Regulation: The regulatory landscape for nutraceuticals can be complex, and not all products undergo the same rigorous testing as pharmaceuticals. Nutraceuticals are often regulated as food products, rather than pharmaceuticals. In India these do not require premarket approval by regulatory bodies like the USFDA. Food Safety and Standards Act (FSSA) regulate nutraceuticals as "food for special dietary application".

Precautions to be Taken While Using Nutraceuticals

Consult Healthcare Professionals: It is essential to consult with a doctor or registered dietitian before using any nutraceuticals, especially if you have existing health conditions or are taking medications.

Choose Reputable Brands: Always buy nutraceuticals from reputable manufacturers that follow good manufacturing practices.

Read Labels Carefully: Pay close attention to dosage recommendations, potential side effects, and interactions.

Monitor Your Body: Be aware of any adverse reactions and discontinue use if you experience any negative effects.

Focus on Whole Foods: Prioritize a balanced diet rich in whole food as the primary source of nutrients not on supplements.

Conclusion

With growing economy and lifestyle changes there are increasing cases of noncommunicable and chronic diseases affecting the larger population of our country. People are becoming health conscious through digital media; preventive health care is gaining importance leading to unprecedented demand for nutraceutical products. The market for dietary supplements and nutraceuticals taken to improve the health or well-being of the customer is enormous. However, they are not necessarily safe for everybody. Like regular drugs, supplements with active ingredients that provide a physiological or pharmacological effect are likely to also cause adverse effects in susceptible individuals. Though regulatory bodies (FSSAI) are working to ensure safety, the individual users should give more attention to adverse effects and potential interactions to avoid serious medical outcomes. Nutraceuticals are no magic pills; balanced diet should be given utmost importance. The individual users must consult physicians or health practitioners before taking these supplements. The health practitioners should take feedback from users/patients and refer to updated research literature before beginning or advising a regimen involving these substances.

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