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COMPARATIVE ANALYSIS OF REGULATORY FRAMEWORK FOR NUTRACEUTICALS IN INDIA AND USA

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ABSTRACT

The term Nutraceuticals is derived by the combination of nutrition and pharmaceutical. Now-a-days these Nutraceuticals play a major role in the world to enhance the health conditions of humans. Nutraceuticals means food or part of food which increases the health conditions by preventing the diseases. At present the society facing many health problems due to nutritional imbalance. As a result, if "food is your medicine" in such a situation, it would be ideal to obtain a healthy body and mind. For each country there is set of different guidelines and regulatory registration process for nutraceuticals. This article gives a brief overview of the nutraceuticals regulations. In US the nutraceuticals are regulated by Dietary Supplement Health and Education Act of 1994 (DSHEA) under United State Food and Drug Administration. In India the nutraceuticals are regulated by Food Safety Standard Authority of India. The emphasis is on global harmonisation and harmonized technical requirements for registration of nutraceutical products in this market, with a focus on similarities and variations in nutraceuticals regulatory framework and structure in the United States and India. The main aim to introduce the regulatory authority for nutraceuticals is to improve the product quality and safety of nutraceutical products during human consumption. The study of variances and similarities might be used to develop ways to achieve worldwide harmonisation, which is now a critical regulatory need and it is based on all of the legal requirements.

Keywords: Nutraceuticals, Regulatory Authority, Regulatory approval process, dietary supplements, health claims

INTRODUCTION

Nutritional health products, defined as any food or parst of a food that provides health benefits (including disease prevention or treatment), have become a necessity for consumers in developed and developing countries. In 1989, Stephen DeFelice, M.D., founder and chairman for the Foundation and Innovation in Medicine (FIM) derived the term "nutraceutical" from "nutrition" and "pharmaceutical basically, it's used as a marketing term **[1]**. In India, it is the Food Safety and Standards Agency (FSSA), which primarily defines Nutraceuticals as "special diet foods". In this states that, if "food is your medicine", then physical and mental health is good.

Nutritious foods are products extracted from food sources that claim to provide additional health benefits in addition to the basic nutritional value in foods. Depending on the jurisdiction, the products may claim to prevent chronic diseases, improve health, delay the aging process, extend life expectancy, or support body structure or function.

Nutraceuticals or "bioceuticals" is a substitute for a drug that claims to have physiological benefits. In the United States, "nutritional foods" are basically unregulated because they fall into the same category as FDA dietary supplements and food additives and are subject to the Federal Food, Drug, and Cosmetic Act.

Nutrients are naturally occurring biologically active compounds with general medicinal, health promotion or disease prevention properties. This category includes vitamins, minerals, herbal supplements and certain animal products. In addition, nutritious foods also include "functional foods", that is, foods that promote specific health benefits based on their ingredients.

Classification off nutraceuticals

Nutraceuticals are classified on the basis of their natural or synthesis sources

I. Traditional foods and
II. Non-traditional foods.

Traditional foods

Theses traditional foods are mainly obtained from the natural sources like obtained from the plants, animals and microbial sources.

They include a variety of natural components, such as omega-3 fatty acids in salmon, saponins in soy, and lycopene in tomatoes, that provide advantages beyond basic nutrition. The traditional nutraceuticals are divided or classified into the following:

a) Chemical constituents:
    I. Nutrients
    II. Herbals
    III. Phytochemicals
b) Nutraceutical Enzymes:

Chemical Constituents

c) Probiotic Micro-organisms

a) Chemical constituents

Nutrients

The Amino acids, fatty acids, minerals, and vitamins having known nutritional activities. Vitamins are found in almost all meals and can help treat disorders such as stroke, cataracts, osteoporosis, and heart disease. Minerals present in plants, animals, and dairy products aid in the prevention of osteoporosis and anemia, as well as the development of strong bones, teeth, and muscles, as well as the improvement of nerve impulses and heart rhythm.

Herbals

Herbal nutraceuticals aid in the improvement of health and the prevention of chronic illnesses like Analgesic, anti-inflammatory, astringent, antipyretic, and Antiarrhythmics are the most common. Several of the plants include tannin, which is said to help with depression, colds, stress, cough, hypertension, and asthma, while proanthocyanadin, which is contained in some herbals, is said to help with cancer, ulcers, and urinary tract infections.

Phytochemicals

Plant nutrients having specific biological actions that benefit human health are known as Phytochemicals it is also known as Phytonutrients. They function as substrates for biochemical reactions, cofactors or inhibitors of enzymatic reactions, absorbents that bind to and eliminate undesirable constituents in the gut, and promote the absorption.

b) Nutraceutical enzymes

These enzymes come from a variety of sources, including plants, animals, and microbes. Enzymes are vital components of life; without them, our bodies would not operate properly **[2]**. Enzyme supplements in the diet can help with medical diseases such as blood sugar abnormalities, digestive issues, and obesity.

c) Probiotic Microorganisms

Probiotics is a term that means "for life." They are characterized as living microorganisms that, when taken in sufficient concentrations, have a beneficial influence on the host's health. These bacteria are sensitive microorganisms that help in digestion and nutrition absorption. They primarily function to push out pathogens such as yeasts, bacteria, and viruses that may cause sickness, and to form a mutually beneficial symbiosis with the human gastrointestinal system.

Non-traditional foods

These are biotechnologically created fake or artificial foods. Food samples' bioactive components are manipulated to create goods/ products that promote

human health. Fortified nutraceuticals and recombinant nutraceuticals are two types of nutraceuticals.

a) **Fortified nutraceuticals:**
Nutraceuticals derived via agricultural breeding, as well as additional nutrients and/or additives, are examples.[2] Cereals fortified with vitamins or minerals, milk fortified with calciferol for vitamin D deficiency, flour fortified with folic acid.

b) **Recombinant nutraceuticals:**
Probiotics and bioactive component extraction using enzyme/fermentation methods, as well as genetic engineering technology, are examples of recombinant nutraceuticals. Cows with lactoferrin deficit, for example, are modified with recombinant human lactoferrin to overcome the lactoferrin insufficiency.

Functional foods

Functional foods are fortified or enriched during processing and then marketed as providing some benefit to consumers **[3]**. A food product that is part of usual diet but has beneficial effects that go beyond the basic nutritional function. Functional foods are made up of physiologically active ingredients derived from plants or animals.

Examples:

- Yogurts - Probiotics for intestinal health.
- Foods/cereals enriched with soluble fibers, vitamins and minerals **[4]**.
- Omega-3 milk in prevention of heart disease

Medicinal foods

A food that is "formulated to be ingested or delivered under the supervision of a physician and it is prepared for a special dietary management of a disease or condition for which distinctive nutritional requirements are defined by medical evaluation.

- Health bars with added medications
- Transgenic cows and lacto-ferrin for immune improvement **[4]**.
- Transgenic plants for oral vaccination against infectious disease

Dietary supplement

A dietary supplement is a product taken by mouth that contains a 'dietary ingredient' intended to supplement the diet. It is defined as any product (except tobacco) that is meant to complement the diet and contains one or more of the following ingredients: a vitamin, mineral, herb, or other botanical; an amino acid or metabolite; an extract; or any combination of the above **[3]**. These dietary supplements may be marketed in food form provided it is not represent as a regular food and is

clearly labelled as a dietary supplement, according to US Food and Drug Administration (FDA) standards. Specific health or structure/function claims are permitted on dietary supplements if the FDA determines that the claim is supported by sufficient scientific evidence.

Examples:

- Minerals, carnitine, co-enzyme Q
- Gingsing, Gingko Biloba, Saw Palmetto **[4]**

Current scenario

In 2017, the Indian market only accounted for 2% of the global health care products market. As of 2019, it was valued at approximately 5 billion U.S. dollars and is expected to reach 11 billion U.S. dollars by 2023, with 21% annual growth rate and by 2023; India is also expected to occupy at least 3.5% of the world market.

The Indian Nutraceutical market is controlled by FMCG (fast moving consumer goods) vendors and pharmaceutical organizations. In India 64% of Nutraceutical market includes vitamins and mineral supplement. There are two main categories in Indian Nutraceutical market.

(i) Functional foods and beverages and

(ii) (ii) Dietary Supplements.

(i) Functional foods and beverages: This category covers almost 60% of the total market According to WHO the fortified food is referred to the addition of micro-nutrients to the processed food which includes all the fortified drinks, fortified juices, fortified foods and energy drinks.

(ii) Dietary supplements: The remaining 40% is covered with Dietary supplements in Indian Nutraceuticals market **[5]**. It includes Minerals, herbal supplement, Vitamins, protein supplement and Chyawanprash.

NUTRACEUTICAL REGULATION IN INDIA

The Food Safety Standards Authority of India (FSSAI) is the governing authority in the nation that grants approval for the registration of Nutraceuticals and food products. It also improves public awareness of the country's food safety regulations. The Food Safety Standard and Standards Act was adopted in 2006 to create a legislative agency that regulates the manufacturing, storage, distribution, sale, and import of food and food items in order to make sure their availability within the country. Nutraceuticals are classified as foods under the FSS legislation of 2006 and the rules and regulations of 2011. They issue a regulation regarding licensing, registration of food business, manufacturing, packing and labelling, and food product standard.

The FSSA is divided into 12 chapters, each containing 101 parts and two schedules. The FSSA integrates the key elements of

the Prevention of Food Adulteration Act of 1954, with the goal of creating a single point of reference for all issues concerning food safety and standards. The Food Safety and Standards Authority of India (FSSAI) is established by the regulatory authority of FSSA, with a chairperson and 22 members **[5]**. The FSSAI will be aided in carrying out the requirements of the FSSA by a Central Advisory Committee (CAC), Scientific Panels (SPs), and a Scientific Committee (SC), each with specialized functions.

After conducting the necessary scientific review, the Food Authority may enlist certain nutraceuticals as approved from time to time. Nutraceutical labelling must comply to the packaging and labelling criteria outlined in the Food Safety and Standards (Packaging and Labeling) Regulations, 2011. The Food Safety and Standards Act will encourage producers to do product R&D, establish dependable processes, and conduct clinical research. These FSS act regulates the food, nutraceuticals, food for medical purpose, dietary food and novel food **[6]**. The Foreign Direct Investment Act they also Provide a new opportunity for foreign companies to manufacture and market Nutraceutical goods in India.

In India, dietary supplements are called "foods for special nutritional purposes". According to the Food Safety Standards Authority (FSSA), "foods intended for specific dietary or functional foods, dietary supplements, or dietary supplements" is

- Foods that are specially processed or formulated to meet special dietary requirements arising from certain physical or physiological conditions or certain diseases and disorders and are presented as such are significantly different from the composition of normal foods **[7, 8]**. It is necessary to distinguish between the compositions of these foods that differ from each other in the presence of such ordinary foods, and in the presence of such ordinary foods, the composition of equivalent ordinary foods. Equivalent properties if they must be significantly different.
- Minerals, vitamins, proteins, metals, or their compounds, or amino acids should not exceed the Recommended Daily Allowance for Indians.
- A product labelled as "Food for specific dietary applications or functional foods or nutraceuticals or health supplements or similar such foods" that is not intended for use as a conventional food and is available in powders, granules, tablets, or other similar forms **[8]**.
- Such a product does not contain a medication or Ayurvedic medicine.

- Does not make any claims to cure or alleviate any specific illness, ailment, or condition (save for limited health benefit or promotion claims as allowed by FSSA laws).

Eligible Products for FSSAI License

Nutraceuticals Regulations' cover the following eight categories of Functional foods:

1. Health Supplements
2. Nutraceuticals
3. Food for Special Dietary Use
4. Food for Special Medical Purpose
5. Specialty food containing plant or botanicals **[9]**
6. Foods Containing Probiotics
7. Foods Containing Prebiotics
8. Novel Foods

Documents Requirement for FSSAI Food License

The documents required to register the food license for FSSAI is based on kind of registration-

– The Registration for Food License in Form A and Form B is depends on annual turnover of food business

For tiny FBO only registration with food, authority is required.

Annual Turnover Registration / License

- If the annual turnover is below 12 Lakhs then the food business operator must undergo Basic Registration in FORM A to get approval license **[5]**
- If the annual turnover is inbetween 12 lakhs – 20 Crores then the food business operator must register in FORM B that is for State License
- If the annual turnover is Above 20 Crores then they must apply for Central License FORM B

Documents required with Form A

- Passport size photograph of FBO
- Documents for Identity Proof such as ration card, voter ID card, Pan card, driving license, passport, Aadhar card, Senior Citizen
- Supporting documents (if any needed) NOC by Municipality/Panchayat, Health NOC

Documents required with Form B (State License and central license)

- Form B must be properly completed and signed (in duplicate) by the authorised signatory's proprietor or partner.
- Manufacturing and processing units must offer a blueprint layout of the processing units.
- It is mandatory for companies to list the address and contact details of Partners/ Proprietor / Executive Members of society **[5]**.

- Aadhar card or any address proof or any ID which is issued by Government authority
- The manufacturer should notify the list of food category to be manufactured
- Analysis report of water used as an ingredient in food approved for portability / from the Institute of Public Health
- A manufacturer should submit a Copy of License
- If there is Food Safety Management System plan or certificate
- Transporters should submit the documentary proof for Turnover and the transporters should declare the number of vehicles that are transporting
- A photo of Production unit
- Declaration form

Regulatory Requirements in India [10]

1. Product Evaluation: evaluation of all active ingredients & additive.

Various steps involved in product evaluation are as follows

- Preparation of extracts from documents
- Sample collection
- Sample dispatch to competent authority (different procedures for bulk pack and single pack)
- Food analysis
- If analysis is not Within specified time limit Further action plan taken by designated officers
- Decision-making process (compliance with investigation, Appeal process, hearing, etc.)

2. Licenses: 4-5 licenses are required to register in India.

- Import license
- Manufacturing license
- Marketing license and
- Other State and Country Licenses/Licenses Required by Regulators before Launch these products in India.

3. Health and label claims: "Health claims" means any expression that states, suggests or implies that a link between a food or a ingredient of this food and health. These includes

- India- specific labeling and packaging requirements
- Consignment composition packaging for consignment sales and marketing procedures
- Need a Sample material requirements and declaration of registration
- Label content and claims
- Structure - function claim

Health claim:

1. Nutrient content
2. Disease claim reduction

Claim 3: Structure/Function

Nutritional Statement

A nutritional claim, such as "low fat," "no added sugar," or "rich in fiber," implies that a meal provides nutritional benefits **[11]**.

A claim is a statement that indicates a link between food and health, such as "lowering cholesterol," "reinforcing the body's natural defenses," or "improving learning capacity."

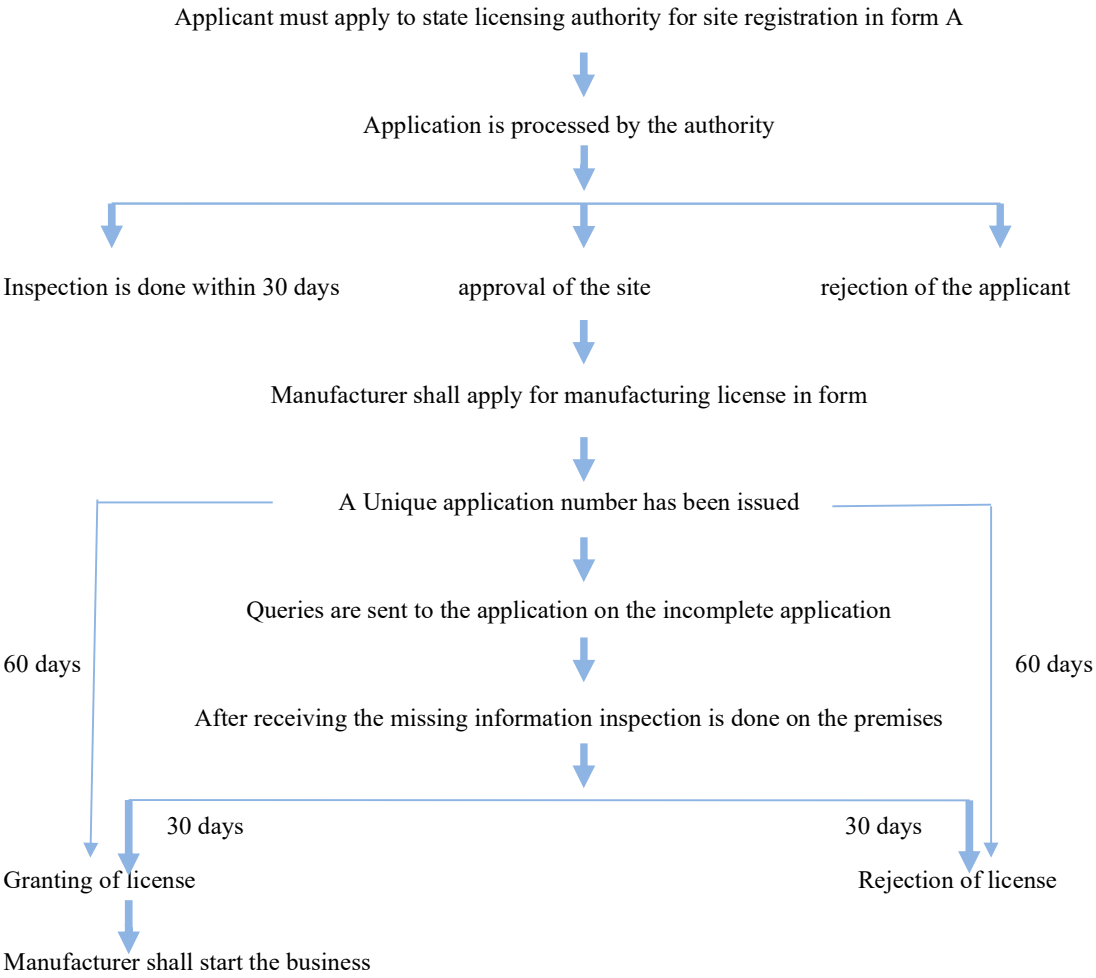
Disease Claim Reduction:

Any claim says or suggests that taking dietary supplements or one of its ingredients reduces the risk of human disease development considerably.

Claim of Structure/Function

A structural claim on a food or dietary supplements label refers to how the product impacts the human body structure.

REGISTRATION PROCESS FOR NUTRACEUTICAL IN INDIA [7, 10]



NUTRACEUTICAL'S REGULATION IN UNITED STATES

According to United States, nutraceuticals are referred as a dietary supplement. The United States Food and Drug Administration (USFDA) define nutraceuticals as dietary supplements or ingredients. In 1994 the Dietary Supplement Health and Education Act came into the force. The Dietary Supplement, Health and Education Act (DSHEA) of 1994 is a federal law that regulates dietary supplements. The DSHEA stripped the FDA of its jurisdiction to oversee "dietary supplements," classifying them as a "separate regulatory category of food **[12]**." They do not even fall under either the food or medication categories.

These regulations include the following:

1. Minerals and vitamins
2. Phytochemicals or Herbs
3. Amino acids
4. Use of probiotics
5. A dietary supplement that boosts the total amount of nutrients in the body.

- Nutraceuticals are commonly known as dietary supplements and they are derived from the food that contain a concentrated amount of bioactive substance but now present in a non-food matrix to utilize and enhance the health conditions by increasing the doses those of obtained from regular food. Eg. Ipriflavone, a synthetic derivative of the isoflavone daizein found in soy protein, is a nutraceutical.
- The finished products of dietary supplements and dietary ingredients are regulated by FDA. According to FDA the Dietary supplements are governed by a separate rules and regulations than "ordinary" foods and drugs. The Dietary Supplement Health and Education Act of 1994 (DSHEA) require the following:

➢ Before a dietary supplement or dietary component is advertised, the producer is responsible for ensuring that it is safe.

➢ Once it is marketed, the FDA is responsible for taking action against any dangerous dietary supplement product.

- According to FDA regulations at 21 CFR part 111, all domestic and foreign companies that manufacture, package, label, or hold dietary supplements, as well as those involved in testing, quality control, and dietary supplement distribution in the United States, must follow the Dietary Supplement Current Good Manufacturing Practices (CGMPs) for quality control.
- Furthermore, any significant adverse event reports connected with the use of a dietary supplement in the United States must be sent to FDA by the manufacturer, packer, or distributor

whose name appears on the label of a dietary supplement sold in the United States.

- Product information like as labelling, claims, package inserts, and associated literature are among the FDA's obligations **[11]**. Federal Trade Commission (FTC) that regulate the advertising of dietary supplement

Health Claims in the United States

Health claims are statements placed on food, food products, or dietary ingredients that claim to lessen the risk of illness or condition.

1.Claims about nutrient content:

This refers to the amount of a nutrient or dietary item in a serving, either directly or indirectly. They're only allowed to use those that the FDA has approved **[11]**.

Nutrient content claims made in absolute terms:

- These are direct comments regarding a nutrient's concentration in a product.

Claims about relative nutritional content:

- Compare the nutritional content of one product to that of another.
- Nutrient content statements that are based on assumptions.

Due to that the Claims are not expressly stated but are suggested by association with an ingredient that is known to contain or be devoid of a specific nutrient.

2.Claims Regarding Health:

The FDA has approved these health claims.

SSA Insurance Claims (Significant Scientific Agreement):

These statements are applicable to both traditional foods and dietary supplements. After a careful review of the scientific literature, the FDA approved SSA claims. The SSA criteria is used to determine if the nutrient/disease link is well-established **[9]**.

FDAMA (FDA Modernization Act)

At present moment, these claims are solely valid for traditional foods and cannot be applied to dietary supplements. As a result of a stakeholder's notice, FDA approves the use of an FDAMA claim **[9, 11]**.

Health Claims That Are Valid:

These statements are applicable to both traditional foods and dietary supplements. Anyone interested FDA may be asked to make a rule on a health claim by a third party. The FDA assesses the petition using the SSA criteria.

3.Claims about structure and function:

- Describe how a nutritional or functional component affects or maintains proper bodily structure and function, as well as overall health **[10]**.
- Cannot state or suggest that a nutritional or functional component influences the diagnosis, cure, mitigation, treatment, or prevention of a disease or health-related condition (a claim doing this is an unauthorized drug claim.

Registration process for Nutraceutical in US

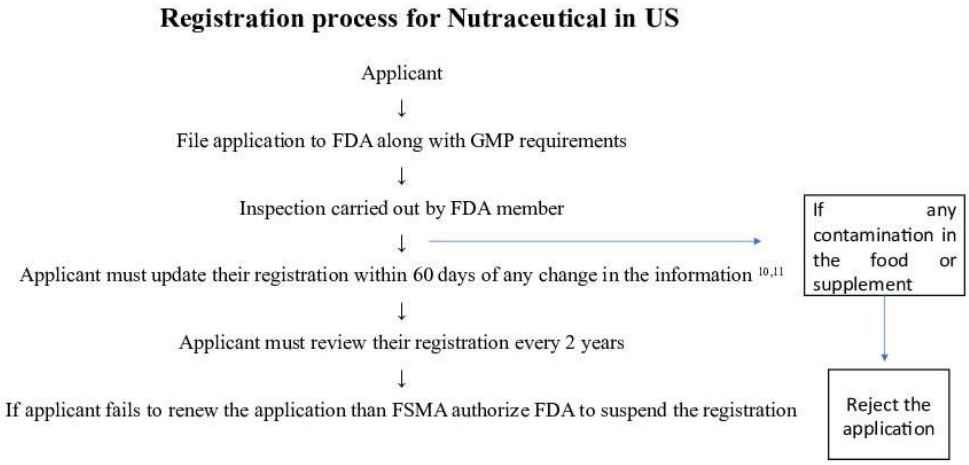


Table 1: Comparative Study Of Nutraceuticals Regulation In India And USA

Content	INDIA	USA
Definition	**A nutraceutical is a food or food-related component that has been shown to provide health benefits, such as illness treatment and prevention. [8,10,11]**	**Nutraceuticals are "foods, or components of foods, that provide medicinal or health benefits, such as sickness prevention and treatment."[10,11]**
Rules	**Food safety and standard Authority of India**	**USFDA**
Regulatory Authority	**Food safety and standard Authority of India (FSSAI)**	**Dietary Supplement Health and Education Act (DSHEA)**
Health Claims	**• Nutritional claim, • Health claim a. Nutraceutical ingredient b. A health related benefit c. Other claims**	**• Health claims • Nutrient claims • Structure/ function claims and related dietary supplement claims**
Regulations	**Food safety and standard regulation**	**Dietary Supplement Health and Education Act (DSHEA)**
Year in which regulations came into force	**2011**	**1994**
Regulatory requirements for registration	**• Product evaluation • Licenses • Health & label Claim**	**• Product licensing • Evidence requirements for safety & efficacy • A Labelling • Heath claims • Good manufacturing practices (GMP) • Adverse reaction Reporting Clinical trials**
Form for registration	**• Form A, B&C**	**• Form 3537**
Fees for registration	**• Rs.100 for registration and Rs.1000 for license [9]**	**• Not required for USA**

CONCLUSION

Nowadays nutraceutical products are used to treat various types of diseases and these products are used to enhance the immunity, delay the aging process, support and to regulate body functions. Hence to increase the safety and efficacy of nutraceutical products they introduced regulatory authority for each and every country therefore it is important to follow and understand the regulatory requirements to that submitting country.

The Dietary Supplement and Health Education Act (DSHEA) were updated in 1994 in the United States, providing a pathway for the registration of nutraceuticals/dietary supplements in the nation for marketing purposes. Food Safety Standards Act 2006 and Food Safety Standard Rules and Regulations 2011 are in place in India to prevent nutraceutical products from being classified as either food or medication. When a new product or entrant wishes to join the Nutraceutical market of a certain nation, it is critical to adhere to the regulatory framework of that country, but this is dependent on the control of purity, effectiveness, and safety.

CONFLICT OF INTEREST:

The authors have no conflict of interest regarding this investigation.

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None

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