

A Conceptual Study on Nutraceuticals in Ayurvedic Perspectives, Current status and prospects of Ayurveda nutraceutical in Nepal

Introduction

Background

Ayurveda, a 5000-year-old health science, has mentioned benefits of food for therapeutic purposes. The term nutraceuticals have been applied to products that other than nutrition, are isolated from herbal products, dietary supplements (nutrients), specific diets and processed foods such as cereals, soups and beverages that are also used as medicine. Nutraceuticals are food or part of food that provide medical or health benefits including the prevention and/or treatment of a disease. Nutraceutical has more advantages over the medicine as they avoid side effect, have been fortified naturally with dietary supplement etc. Nutraceutical, on the basis of their natural source, chemical grouping, can be broadly categorised into three key terms –nutrients, herbals, dietary supplements and dietary fibres. The most rapidly growing segments of the industry are dietary supplements (19.5 percent per year) and natural/herbal products (11.6 percent per year). Nutraceuticals, in contrast to pharmaceuticals, are substances, which usually do not have patent protection. Though both pharmaceutical and nutraceutical compounds might be used to cure or prevent diseases, but only pharmaceutical compounds have sanction of the government. Dr Stephan De Felice coined the term Nutraceuticals from “nutrition” and “pharmaceutical” in 1989. Related terms are “functional food” and “dietary supplement”. Ayurvedic principles, dietetics, nutrition, pharmaceutical preparations can also be correlated with nutraceutics in the present scenario. This includes antioxidants, digestive stimulants, and probiotics etc which are very important in the present scenario. Through Ayurveda, we can bridge the gap between food and medicines. *Ahara* is indicated as best medicine as per Ayurveda which is similar to that of the concepts of Hippocrates. ^[1] Ayurveda is based on the belief that nothing is right for everyone and everything is right for someone. The levels at which an *Ahara* becomes preventive or curative (*Aushadha*)

depends on a lot of factors like properties and qualities of *Ahara* used, *Prakriti*, *Sara* and *Dosha* of the individual etc. Although the concept of nutraceuticals is gaining momentum and popularity more recently, its roots can be traced to the ancient Ayurveda system of medicine. [2] Other divisions of Ayurveda like *Rasayana*, *Panchakarma* also have benefited from *Pathya-Apathya* concepts. The nutraceutical application spread in these areas have yet not been explored. Hence imparting more focus on nutraceutical applications will be beneficial for the growth of Ayurveda in this direction.[3] The *Pathya-Apathya*, *Hitha-Ahitha*, *Sathmya–Asathmya* are based on an individualistic approach. Apart from this, *Rasayana* is the most advanced form of preventive application specific to disease, age, climate etc which is similar to current nutraceutic practice. [4] Since principles of both are complementary to each other and go together hand in hand, it would yield better result especially in present era. Demand for quality of life has fuelled the ‘nutraceutical revolution’ and increased the trend of seeking traditional or alternative beneficial products. The association of nutraceuticals with traditional medicine brings the long-standing consumer acceptance. The classical texts of Ayurveda are filled with scattered references on the implication of food products in various diseases. [5] Ayurveda plays a great emphasis on the quality of nutritious food for (i) preventing the degenerative changes caused by ageing (*Rasayana*), (ii) post illness/convalescence phase nutrition (*Balya*), (iii) enhancing the immunity (*Vyahikshamatwa*) (iv) maintaining the vitality (*Vajikarana*). [6,7] Supplementation of nutrients which improves the quality of *Ahara rasa*, improving the process of absorption in other words improving bioavailability of nutrients by handling digestive fire (*agni*), by improving proper assimilation of nutrients by cleaning the body channels (*srothoshoushathva*) and making the nutrients available for the tissue, by enhancing tissue utilization or tissue uptake of the available nutrients. This is very important for proper functioning of tissues with above four steps of circulation that leads to *Dhathu Upachaya*. The concept of *Rasayana* (Rejuvenation therapy) is a broad concept in Ayurveda and embraces more components than today’s nutraceuticals.[8]

Purpose

To gather up to date information regarding the current status and prospects of Ayurveda nutraceuticals in Nepal.

Objectives

The present study aims to validate the nutraceutical aspect in Ayurveda. It explains the Ayurvedic perspective of nutraceuticals and provides details about *Rasayana*. The study also correlates and discusses nutraceuticals and *Rasayana*.

Specific Objective:

1. To enlist natural, herbal or Ayurveda nutraceuticals.
2. To assess ingredients, composition, dose, price and manufacturing companies of the nutraceutical products.

Rational

A significant proportion of population consumes nutraceuticals to achieve good health and ensure longevity. Most of the companies or manufacturers are producing their products in the name of herbal or natural products and claim no harm or side effect of the products. There is a well-known understanding that herbs practised in Ayurveda are safe and effective, which they are, if used under proper supervision. Nowadays, many products have been imported from abroad and are marketed as natural or herbal food supplements. Almost all importers and suppliers are located in Kathmandu valley. Hence, this study aims to evaluate herbal ingredients, its composition, dose and description of the ingredients in Ayurveda. It is interesting to learn that Ayurveda lays a great emphasis on the quality of nutritious food for (i) averting the degenerative changes caused by ageing (*Rasayana*), (ii) convalescence after an illness (*Balya*), (iii) enhancing the defence system (*Roga Pratibandhaka Rasayana*), (iv) maintaining vigor and vitality (*Vajikarana*) and (v) for maintaining the joie-de-vivre (*Jeevaniya*). The category of *Rasayana* drugs is broadly subdivided into three categories, *Kamyas* (for vitality, intellect etc.), *Naimmitika* (for specific disorders) and *Ajasrika* (general) wherein the last one deals with the daily consumption of specific food products to rejuvenate the body. These food products are said to improve the quality of life by offering protection from internal and external stress factors. The usage of nutraceuticals as advocated by Ayurveda can also be classified depending upon the age of the individual, season of consumption, time of consumption, physiological conditions and according to the target organ. Ayurveda states that sound health depends on three biological forces named as *Vata*, *Pitta* and *Kapha*, which are all pervading and in their state of equilibrium, are responsible for healthy structural and functional setup. Although different levels of their predominance are said to determine different types of physical disposition (called *Prakruti*), their levels tend to vary according to age as well.

Literature Review

Nutraceutical approach in Ayurveda:

The prime aims and objectives of the Ayurveda is the establishment of the healthy condition and removes disease condition. In Ayurvedic dietetics importance given to food in prevention and treatment of disease as well as herbs and herbal formulations are the part of daily food supplements. According to Acharya *Charak*, a diet which besides providing the basic nutrition to the body, help to maintain the healthy state of the body and prevents the occurrence of diseases should be consumed. An interesting verse by Acharya Lolimbaraja regarding the importance of food is, if wholesome diet is given in a planned way, then there is no need to administer medicines and if wholesome diet is not being used then too there is no need to give medicine as this is not going to cure the disease in the absence of wholesome diet. The concept of *Aahar* is a holistic approach and far beyond the modern view. An indication of *Pathya-apathy*, *Hita-ahita* and *Satmya-asatmya* are based on individualistic approach. Ayurveda has a great emphasis on the quality of nutritious food as *Rasayana* (preventing degenerative changes), *Balya* (Post illness nutrition), *Brihan* (Provides deficient nutrient), *Jeevaniya* (maintaining longevity), *Vyadhikshmatva* (enhancing the immunity) and *Vajikaran* (maintaining vitality and vigor). The science of food and nutrition in Ayurveda was much developed. Acharya *Charak* has categorized all food items into twelve classes, Acharya *Sushrut* in ten and thirteen. There is another classification based on consistency of food products as *Ashita* (Semi-solids, advised for aged people), *Khadita* (solid food, advisable for young people with good digestion), *Peeta* (liquid in consistency, advisable for the newborns, children and diseased people and advocated in summer) and *Leeda* (Paste form that can be licked, advisable for children, convalescing and old people).

In Ayurveda, the importance of particular diet in prevention and treatment of diseases was well known even in 1000 BC. For ages, people in Nepal and India, because of their cultural beliefs and experiences have taken herbs and herbal formulations as part of their daily food supplements. The faith in the power of botanicals along with the availability of a vast majority of different kinds of herbs in India has always been a thrust behind the survival of this scientific art of healing.

“Tat cha nityam prayunjeet svasthyam yen anuvartate.

Ajaatanam vikaranam anuttpattikaram cha yat.”

(Charaka Samhita: Sutra Sthana: 5)

(The diet which besides providing the basic nutrition to the body, helps to maintain the healthy state of the body and prevents the occurrence of diseases should be consumed).

An interesting verse regarding the importance of wholesome diet goes as:

“Pathye sati gadaartasya kim aushadh nishevane.

Pathye asati gadaartasya kim aushadh nishevane.”

(Vaidhya Jeevana: 1/10)

(If wholesome diet is given in a planned way, then there is no need to administer medicines and if wholesome diet is not being used then too there is no need to give medicine, as this is not going to cure the disease in the absence of wholesome diet).

The science of food and nutritional in Ayurveda was so developed that Charaka (an Ayurvedic Scholar) has categorized all the food items into twelve classes: corns with bristles, pulses or legumes, meat, leafy vegetables, fruit, vegetables which are consumed raw, wines, water from different sources, milk and milk products, products of sugarcane, food preparations, and accessory food items such as oils and salts, and has further subcategorized these food groups. Another classification is based on the consistency of food products: Peeta (liquid in consistency, advisable for the newborns, children and diseased people and advocated in summer), Leeda (Paste form that can be licked, advisable for children, convalescing and old people), *Ashita* (Semi solids, advised for aged people) and *Khadita* (solid food, advisable for young people with good digestion). It is interesting to learn that Ayurveda lays a great emphasis on the quality of nutritious food for (i) averting the degenerative changes caused by ageing (*Rasayana*), (ii) convalescence after an illness (*Balya*), (iii) enhancing the defense system (Roga Pratibandhaka *Rasayana*), (iv) maintaining the vigor and vitality (*Vajikarana*), and (v) for 133 maintaining the joie-de-vivre (*Jeevaniya*). The category of *Rasayana* drugs is divided into three categories, *Kamyā* (for vitality, intellect etc.), *Naimmitika* (for specific disorders) and *Aajasrika* (general), the last one dealing with the daily consumption of specific food products to rejuvenate the body. These food products are said to improve the quality of life by offering protection from internal and external stressors. The usage of nutraceuticals as advocated by Ayurveda can be also

classified depending upon the age of the individual, season of consumption, time of consumption, physiological conditions and according to the target organ. Ayurveda states that sound health depends on three biological forces named as Vata, Pitta and Kapha, which are all pervading and in their state of equilibrium, are responsible for healthy structural and functional setup. Although different levels of their predominance are said to determine different types of physical disposition (called Prakruti), age wise also, their levels tend to vary. In brief, while the predominant Kapha in childhood promotes growth and development by supporting the anabolic activities, Pitta in adults maintains a higher metabolic rate and ensures increased productivity/performance, whereas the increased Vata in old age leads to elevated catabolism, wear and tear and ushers us to degenerative changes. For this precise reason, it is important to take these factors in consideration while advocating any nutraceutical. For example paste of Indian Pennywort (*Bacopa monniera*) and Sweet flag (*Acorus calamus*) along with honey is given to the new born to pacify the increased Kapha Dosha and to improve the memory of the child. All the Rasayana and Vajikarana formulations are advocated in the young age while *Chyawanprash* is a Rasayana for old aged as well. Another important aspect enumerated by Ayurveda pertains to the influence of environmental factors on the physiological factors. The external stressors in the form of environmental factors tend to have an impact on the three biological factors. To neutralize these impacts, some recommendations are made. A unique nutraceutical based on seasonal variations is 'Ritu Haritaki' i.e. use of fruit of Chebulic myrobalans (*Terminalia chebula*) as per the season. The fruit should be used along with rock salt (*Saindhava*) in rainy season, with sugar in autumn, with dried rhizome of Ginger (*Zingiber officinale*) in early winters, with fruit powder of long pepper (*Piper longum*) in late winters, with honey in spring and with jaggery in summer season. Another example of use of nutraceuticals as per season is of *Bhallataka Rasayana* (preparation of fruits of *Semecarpus anacardium*), which should not be consumed in summer season. Third category pertains to use depending on the time of consumption. Most of the Rasayanas have been advised to consume in the early hours of the day. Use of ginger mixed with rock salt before meals is advocated to enhance the appetite and aid digestion. Another example is of Triphala Rasayana according to which fruit of Chebulic myrobalans are to be consumed after the digestion of previous meal, of Beleric myrobalans (*Terminalia bellerica*) before taking food and of Indian Gooseberry (*Emblica officinalis*) after taking meal. Another class of nutraceuticals belongs to those

formulations that have been conceived to offer specific benefits in certain physiological conditions. Use of *Satavari Ghrita* (a formulation of *Asparagus racemosus* with clarified butter) is advocated in lactating women to improve lactation. Use of *Dashamoola Ghrita* (*Dashamoola* is a group of ten drugs whose roots are used) after child delivery is advocated to facilitate the involution of uterus to its normal state. Another approach adopted by Ayurveda is organ or body system oriented wherein use is aimed at delivering benefits to a particular organ. Chyawanprash is aimed to give strength to the respiratory system. *Pippali Rasayana* (use of fruit of long pepper with honey) is also advocated to confer immunity to the respiratory system. Use of *Triphala* powder (powder of fruits of chebulic myrobalans, beleric myrobalans and Indian gooseberry) along with honey and clarified butter is advocated for maintaining/improving the eyesight. A confection of Indian Gooseberry is used in households of India during winter season to prevent rhinitis and respiratory tract infections. A confection of rose petals and 134 sugar is employed as mild laxative for children and as cooling agent, which subdues the vitiation of Pitta Dosha. *Ardraka paka* (ginger based confection toffee) is one such preparation, which is made up of ginger, sugar, salt and lemon and is used as an aid to digestion. Confection of Bael fruit (*Aegle marmelos*) is used in the household for the problems of gastrointestinal tract. Paste of *Mentha* leaves (*Mentha arvensis*) is consumed along with meals for preventing abdominal distension. Consumption of grated garlic, fresh ginger and fresh turmeric rhizome mixed with lemon and salt is used as an aid to digestion. Further certain sugar based confections and herb treated clarified butter (ghee) preparations are also used in India as home-remedial nutraceuticals. In this class, commonly used combinations include *Chyawanprash*, *Brahmi Rasayana*, *Phala Ghrita*, *Arjuna Ksheerapaka* and *Rasona Ksheerapaka*.

Rasayana: Nutraceuticals in Ayurveda A one of the novel concepts in Ayurveda, which is more than nutraceuticals, is called Rasayana. The word Rasayana is composed of two words Rasa and Ayana. Rasa means Rasa Dhatu (nutritional plasma) and Ayana means pathway (microcirculatory channels in the body). Rasayana is one of the branches of Ashtanga Ayurveda (eight clinical specialties) which is not only a drug therapy but is a specialized procedure practiced in the form of rejuvenative recipes, dietary regimen and special health-promoting conduct and behavior. Rasayana is the way to attaining longevity, memory, intelligence, freedom from disorder, youthfulness, the excellence of lustre, complexion and

voice, the optimum level of physical strength and sense organs. Rasayana drugs act on work at Dhatu level which reflects its sub-cellular activity. It can be collectively compared with antioxidant, regenerative, immuno-modulatory, adaptogenic. Rasayana is not only helps in treating a disease but can also be helpful in preventing a disease.

Classification of *Rasayana*: *Charak* has advocated special the outdoor and indoor regimen and he introduced a large number of Rasayana drugs both in single and compounds, herbs and minerals. According to Specific Indication Rasayana may be classified As per scope of use: 1. Kamyā Rasayana: It is used to fulfill the desire for some specific condition. e.g., prana (vitality), Aayu (longevity), Smriti (memory), medha (intellect). (a) Prana kamyā: Rasayan therapy aiming to fulfill desires of vitality and longevity of life e.g. Triphala Rasayana, Haritaki Rasayan. (b) Medhakamyā: Promoter of intellect e.g. Brahmi, Shankhpushpi. (c) Shreekamyā: promoter of complexion and luster, fortune. 2. Naimittika: It hastens the recovery from prevailing diseases and promotes the vitality in specific diseases. e.g. Shilajatu in Prameha, Bhallataka in Amavata. Dhatri Rasayana, Mandookaparni Rasayana, Brahmi Rasayana, and Triphala Rasayana. 3. Ajastrika: Regular use of nutritious foods for the endorsement of health e.g. KsheerGhritaabhyas. As per method of use: 1. Vata-tapika: Therapy in outdoor (OPD) basis. 2. Kuti-praveshik: Therapy in indoor (IPD) basis. As per content of Rasayana: 1. Ausadha Rasayana-Drug therapy 2. Ahara Rasayana- Dietary therapy 3. Achara Rasayana- Code of conduct and daily habits. Nutraceutical vs Rasayana therapy: Nutraceuticals are all about the nutritional fulfillment of the body requirement. There are many reasons for nutritional deficiencies which lead to ailments and degenerative processes. Nutraceutical product provides nutritional supplement which cures the symptoms and prevents from further degeneration. Rasayana therapy is a broad aspect and more than nutraceuticals because it not only provides nutrition but also increases longevity, vitality, immunity and body strength.

Table 1: List of some *Rasayana* preparations

Preparations	Benefits
<i>Chyavanprasha</i>	General health and prevention of respiratory disorders
<i>Brahma Rasayana</i>	Protection from mental stress
<i>Narasimha Rasayana</i>	Vigor and vitality
<i>Phala Ghrita</i>	Reproductive health
<i>Arjuna Kshirapaka</i>	Cardio protection
<i>Rasona Kshirapaka</i>	Cardio protection
<i>Shilajatu Rasayana</i>	Diabetes mellitus
<i>Vachadi ghrit</i>	Improves memory and speech in children
<i>Brahmi ghrit</i>	Improves memory in young and old

Nutraceutical: Nutraceutical is any nontoxic food component which has been used for the improvement of health including prevention and treatment of disease. The term “nutraceutical” was coined from “nutrition” and “pharmaceutical” in 1989 by Stephen De Felice. According to him, a nutraceutical is a food or part of food that provides medical or health benefits including the prevention and treatment of diseases. Nutraceuticals may range from isolated nutrients, herbal products, dietary supplements, genetically improved foods, processed food products. Generally nutraceutical contains vitamins, lipids, protein, carbohydrates, minerals and other necessary nutrients. These are marketed in concentrated forms as pills, capsules, powders and extracts in a single compound or in combined form. Hippocrates known as the father of medicine accepted that food is a medicine. Ayurveda has already stated that food is the greatest medicine. Vitamins and minerals supplements contain isolated nutrients or a combination of nutrients. Nutraceutical supplements contain the compounds that are actually extracted from the whole foods. After extraction, they are concentrated and turned into pills or capsules.

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Vitamin and mineral supplements contain isolated nutrients or a combination of nutrients. Nutraceutical supplements contain the compounds that are actually extracted from the whole foods. After extraction, they are concentrated and marketed in the form of pills or capsules.^[10]

Classification of Nutraceuticals: Nutraceutical is a broad term. There are multiple types of products that are compassed under the umbrella term of nutraceuticals. ^[11]

1. Dietary supplements
2. Functional foods
3. Pharmaceuticals
4. Medical foods

1. **Dietary supplement:** A dietary supplement is a product that contains dietary nutrients derived from food products and are intended to add further nutritional value to the diet. These are concentrated in liquid, capsule, pills and tablet form. It covers the following nutraceutical products. ^[12]

a) Nutrients: Substances such as vitamins, minerals, amino acids, fatty acids and antioxidants are dietary ingredients. Vitamins play an important role in metabolism and enzymatic interaction systems. Minerals are important for immunity, reproduction and growth. Fatty acids are responsible for healthy cell membranes, skin and hair and proper functioning of nervous system, immune system and hormones. Antioxidants prevent cellular damage and aging.^[13]

b) Herbals: Nutraceuticals holds a great promise to improve health and prevent chronic diseases with the help of herbals. Some examples are flax seed oil and powder which contain omega-3 fatty acids which is anti-inflammatory, analgesic, antipyretic, astringent and anti-arthritis.^[14]

c) Phytochemicals: Phytochemicals are secondary metabolites and also act as nutraceuticals. These are non-nutritive plant chemicals that have either defensive or disease protective properties. Chief phytochemicals are polyphenols, isoflavonoids, anthocyanidins, phytoestrogens, terpenoids, carotenoids, limonoids, phytosterols, glucosinolates, and polysaccharides. Dietary intake of phytochemicals may promote health benefits, provide protection against chronic degenerative disorders such as cancers, coronary heart diseases, diabetes, high blood pressure, inflammation, microbial, viral and parasitic infections, psychotic diseases, spasmodic conditions, ulcers, osteoporosis and

associated disorders. Majority of foods such as whole grains, beans, fruits, vegetables and herbs contain phytonutrients/ phytochemicals.^[15] For example, carotenoids (Isoprenoids) found in various fruits, vegetables and egg yolk, are anticarcinogenic, boost immune cells and protect cornea against UV light.^[16]

d) Probiotics: These are live microbial feed supplement for improving its intestinal microbial balance. Specific probiotics are used to treat lactose intolerance, acute diarrhoea and antibiotic-associated gastrointestinal side effects. They help in the production of specific enzyme (β -galactosidase) that hydrolyse the offending lactose into its component sugars. Lactobacillus bacteria and bifidobacteria are the most important probiotics.^[17]

e) Prebiotics: Prebiotics are nutraceuticals which promote the flourishing of probiotics. These are the dietary ingredients that affect the host by selectively altering the composition or metabolism of gut flora. These are short-chain fructo-oligosaccharides that have unique chemical structures that are not digested by humans. The prebiotic consumption generally promotes the lactobacillus and bacterial growth in the gut which helps in metabolism. It is beneficial in improving lactose tolerance, detoxification, and dyslipidaemia, relief from constipation and in certain tumours. Inulin is prebiotic that has been widely used in processed foods. Prebiotics are commercially extracted and concentrated from fruits and vegetables through the hydrolysis of polysaccharides from dietary fibres or starch, or through enzymatic generation. Some sources of prebiotics are chicory roots, onion, garlic, banana, tomato, alliums and beans.^[18]

e) Nutraceutical Enzymes: Enzymes are an essential part of the body which are responsible for many biological functions. Enzyme supplements in diet help to eliminate many symptoms of hypoglycaemia, hyperglycaemia, digestive problems and obesity.^[19]

f) Dietary Fibres: Dietary fibres are the edible plant material that is not hydrolysed by enzymes of digestive tract but digested by the microflora of gut. Dietary fibre includes non-starchy polysaccharides such as cellulose, hemicelluloses, gum and pectin, lignin and resistant dextrin. The soluble components of dietary fibres have bulking and viscosity producing capabilities which retard the gastric emptying of the stomach. This affects the rate of digestion and uptake of nutrients and feeling of satiety. It lowers the LDL and improves glucose tolerance.^[20]

2. Functional food/ Fortified nutraceutical:

Functional food is food in which components or ingredients have been added to give it a more specific medical or physiological benefit, other than having purely nutritional effect alone. The concept of functional food was first-ever introduced by Japan in 1991. When functional food aid in prevention or treatment of disease other than anaemia is called as nutraceuticals. It constitutes fortified food from added nutrients or ingredients. For example- milk enriched with Vit. D, orange juice fortified with calcium, cereal flour added with fibre and folic acid.^[21]

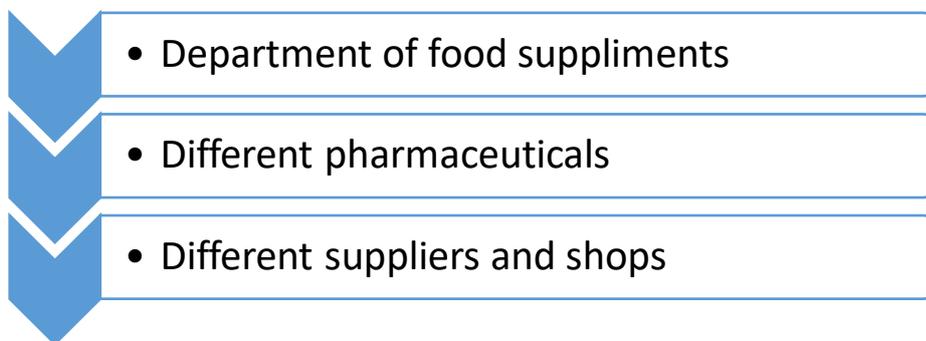
3. Pharmaceuticals/ Recombinant nutraceuticals: The term pharmaceuticals is more frequently associated in agricultural circles, with medical applications of genetically engineered crops or animals. Energy-providing foods such as bread, alcohol, fermented starch, yogurt, cheese, vinegar and others are produced with the help of biotechnology. The production of probiotics and the extraction of bioactive components by enzyme/fermentation technologies as well as genetic engineering technology are achieved through biotechnology.^[22]

4. Medical food: The medical food is formulated to be consumed or administered internally under the supervision of a physician, that is intended for the specific dietary management of certain disease or conditions for which distinctive nutritional requirements, on the basis of recognized scientific principle, are established by the medical evaluation. Medical foods are regulated by the FDA and can be prescribed or monitored under medical supervision. For example- supplement for a patient with inborn errors in amino acid metabolism, hyperhomocysteinemia, pancreatic exocrine insufficiency, cachexia in cancer. ^[23]

Methodology

This is a cross-sectional study that had been planned to collect information regarding Ayurveda nutraceuticals available in the market of Kathmandu Valley with reference to company name, ingredients composition, uses. Furthermore, it includes both Ayurveda products under food and food supplements, nutraceuticals registered at Food and Quality control department, Kathmandu, Nepal. Products will be included on the basis of inclusion of herbs as major ingredients in the composition. This study will provide an overall scenario of manufacturing nutraceutical products and trends of marketing under the name of herbal or natural products. Google scholar, Cochrane library, Pubmed, Scopus, Web science, Science direct, Research gate etc. were searched for published articles. The data collection was done through libraries of universities and departments of different ministries and websites, publications of different departments of government of Nepal for obtaining export and import data as well as Ancient/Ayurvedic literatures for use patterns of the medicinal herbs.

Data collection: All data of different company products of nutraceutical were collected on following manner as explained in chart.

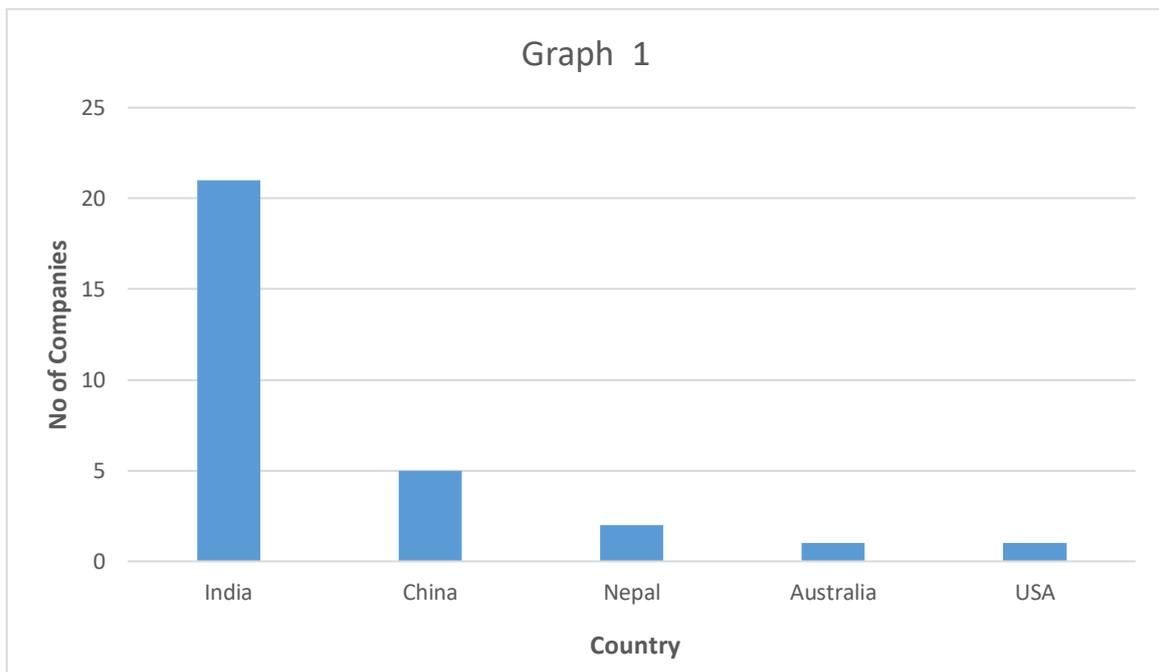


Results

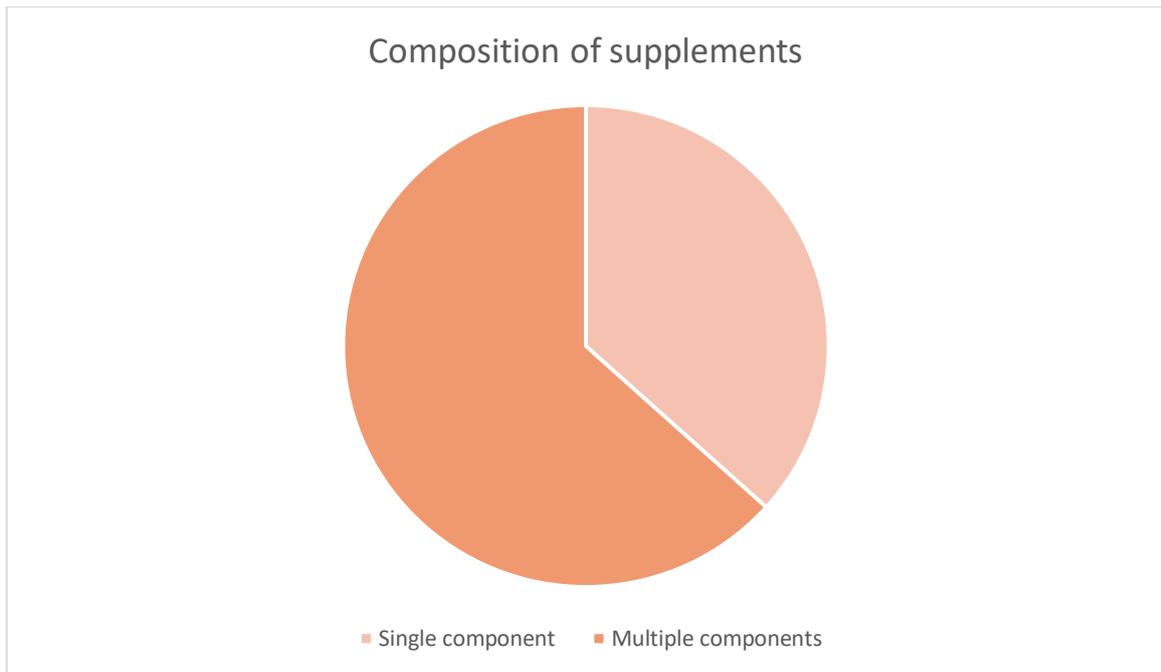
Rasayana therapy is a broad aspect ranging more than nutraceuticals because it not only provides nutrition but also increases longevity, vitality, immunity and body strength. Among other approaches to prevent diseases, nutraceuticals also play an integral role. Preventing or retarding the onset of diseases has become a more attractive and cost-effective strategy in the medical arena. Here Ayurveda provides a holistic and better drug delivery system for dietary supplements and nutrients, which is a proven individualistic protocol since long time. Here we can apply the nutraceutical potential of Ayurveda as preventive, palliative and health promotive measure. *Agni* is responsible to change the

Panchabhautika composition of any *Dravya* via the *Paka* or *Pachana* process which changes the whole composition. Therefore, all the principal food articles described in Brihatrayi are *Saagni Ahara Kalpana*. This can be better applied in the context of *Samsarjana krama*. Since, these *krama* is done to stimulate *Agni* and nourish body; the same can be used in diseases where *Agni mandata* is observed. Any type of medicine administered in body is dependent upon *Agni* for its metabolism. So nutrition in Ayurveda is strictly based on the absorption, assimilation and other host factors. Ayurvedic aspect of nutrition is very comprehensive as well as holistic which is beyond the level of conventional nutritional practices. In *Samsarjana karma*, Ayurveda emphasises on calorie intake as well as nutrient supplementation.

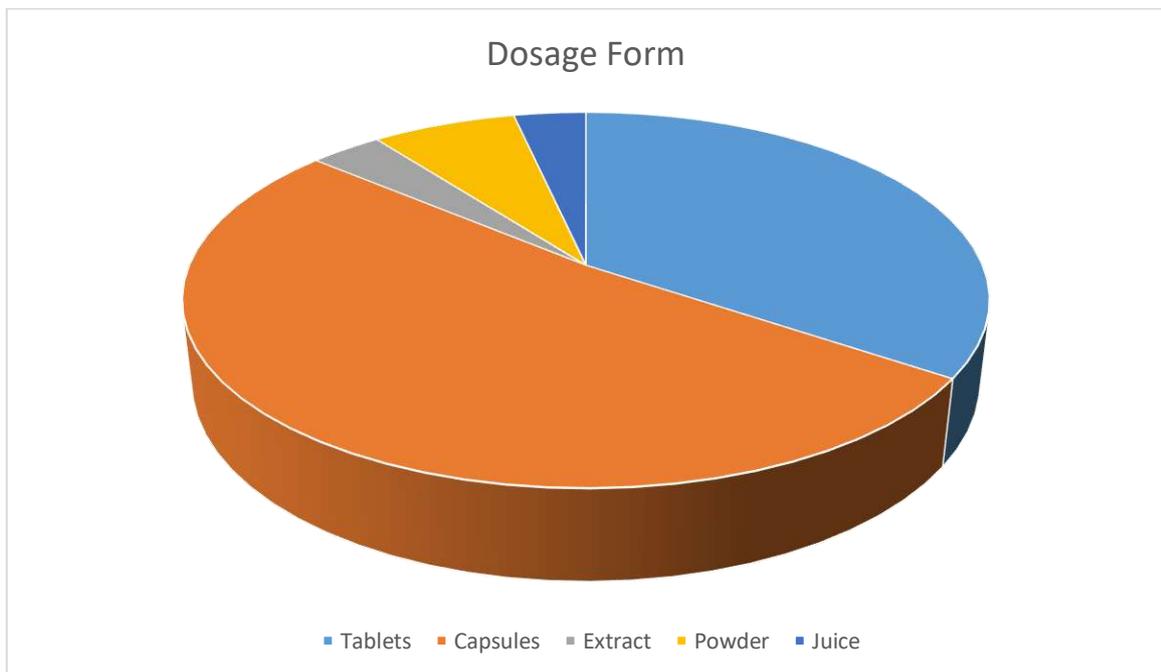
A. Nutraceutical products of different countries: We found around 30 Ayurveda nutraceutical products manufactured by more than 15 companies which has been presented in a graph below. It shows that Ayurveda nutraceuticals are still in regular use by the Nepalese people.



B Nutraceutical supplements according to Composition: The study showed that major supplements had been formulated incorporating multiple components.



C Nutraceuticals according to Dosage Form: The study showed that the major nutraceuticals were in solid form majority of which were in the form of tablets. The liquid dosage forms were found to be in lesser proportions in the Nepali market wherein juice and extract were found to be 1 in number.



D Available Nutraceutical supplements of Ayurveda in Kathmandu:

S.N.	Product	Company	Ingredient	use
1	Tab. Tribull	Contact Manufacturing, Australia	<i>Tribulus terrestris</i> (Gokshur), <i>Avena sativa</i>	Supplement
2	Cap Testrol Gold	Bactolac Pharmaceutical, USA	Shilajit , <i>Avena sativa</i> , ferugeents, B12, B6.....	“
3	Cap Gulcen	Qinghai Qiyng, China	<i>Phyllanthus emblica</i> (Amla), Saffron, myosbala	“
4	Cap Absest	Xiongbalagn, Tibetan , china	<i>Phyllanthus amarus</i> (Bhuiamla)	“
5	Cap Drodge	Xiongbalagn, Tibetan , china	<i>Indula Racemosa</i> (Pushkarmul)	“
6	Cap Brotis	Qinghai Qiyng, H.B. Pharmaceutical China	Tinospora (Guduchi), Gentiana(Kutaki), Myrobalan(Haritaki)	“
7	Cap Haya	Kayamon Tibetan medicine china	<i>Indula Racemosa</i> (Pushkarmul), Myrobalan(Haritaki), Lithospermum	“
8	Tab Curculus	Tactus Nutrascience, India	Turmeric(Haridra)	“
9	Tab Pycorel	Tactus Nutrascience, India	<i>Terminalia arjuna</i> (Arjuna) , <i>Mimosa pudica</i> (Lajwanti), <i>Azadirachta indica</i> (Neem)	“
10	Pow. Testo Power Booster	Athen life science H.P. India	Shilajit , Karen, Ginsen root	“
11	Tab Glyca Care	Zeon life science, India	<i>Cinnamomum zeylanicum</i> (Dalchini)	“
12	Tab Toxiflush	Tripati life science,India	<i>Trigonella foenum</i> (Methi)	“
13	Noni Gold Juice	Almighty agro Jaipur india	Alovera, Ashwogandha, Grap seed, combogia, Gracine	“
14	Cap Garlic	Vritik Herbotak India	Garlic oil	“
15	Pow. Herbo spro	LA Gronde, India	Satavari , Ashogandha, Kushkush, Brahmin, Shakhapuspi	“
16	Tab. Curcumina	Zeon Lifescience india	<i>Curcuma longa</i> (Turmeric), Rhizome ext., Piper nigrum	“
17	Tab. Sami sharp	Zeon Lifescience india	<i>Bacopa Monneri</i> (Brahmi), piper nigrum fruit, oroxy indium root.	“
18	Tab. Livstrong	Zeon Lifescience india	<i>Silybum marinum</i> seed, <i>Phyllanthus amorus</i> (Bhuai Amla)	“
19	Cap CURAR	Phyto specialities india	<i>Centella asiatica</i> (Brahmin)	“
20	Tab Urofizz	Tactus Nutra Science india	<i>Cinnamomum tamala</i> (Tejpat)	“
21	XEN Met-E	Quantum Naturals Guragan	Plant Ext only	“
22	Cap Morinda	Organic world group ktm	Morinda(Mulberry), polyphenols	“

23	Cap Alovera	Organic world group ktm	Alovera	“
24	Cap Asparase	Vijayani Nutraceutical india	<i>Asparagus racemosus</i> (Satavari), carotere, theopoly	“
25	Cap Naturovita	Vijayani Nutraceutical india	<i>Boswellia serrata</i> (Shalaki), Spirulina	“
26	O' Moringa	Vijayani Nutraceutical india	<i>Moringa olifere</i> ext.	“
27	Cap Premium garlic	Vijayani Nutraceutical india	Premium garlic	“
28	Cap Oiacare	Vijayani Nutraceutical india	<i>Tinospora cordifolia</i> (Guduchi), banana ext, cymnema ext	“
29	Oriens strongliv	Vijayani Nutraceutical india	<i>Phylunanthus asmorus</i> , <i>Tinospera cordifolia</i> (Guduchi)	“
30	Orient slim	Vijayani Nutraceutical india	Terminalia , garcinia, cambosia	“

Discussion

The global market is currently experiencing a period of growth post-recession. Even after effect of recession fades, the market for nutraceutical is likely to remain in the growth phase which is driven by an emerging market of countries like India, China, Brazil etc. In case of plant extracts and phytochemicals, various Indian companies have entered their place as prominent suppliers both locally as well as globally, which will help in flourishing nutraceuticals sector in the near future. Government regulations regarding holistic considerations and personalized dietary planning constitute the basic features of the Ayurveda nutraceutical supplements, which will provide optimal health and disease prevention. Nutraceuticals is a connecting link where both the system of medicine should shake their hand with enduring hard core research and mutual acceptance of both the systems. Many Ayurvedic formulations have tremendous nutritional benefits. There are many preparations in classics which have not been used in therapeutics which showcase challenges for pharmaceuticals. There is a need for further research, development and proper planning and execution of government regulations for the emergence of these preparations. Government regulations allow greater legal security and more predicable environment. Government regulations regarding unfair competition from manufactures using false or misleading claims should be formulated and implemented properly and effectively.

Conclusion

The association of nutraceuticals with traditional medicine is bound to bring the long-lasting consumer acceptance. When backed with current modern medical research, the acceptance will be whole hearted. The examples quoted above are of the few nutraceutical preparations picked in their original form from the classical texts of Ayurveda in which fortification in terms of desired effects has been done in a natural way. It is not always possible to find the active phyto-constituent and the rationality of a particular combination of herbs in terms of modern scientific methods as is evident in the black box design of Ayurveda. But all that which is beyond the reach of scientific proof is not irrational and non-existing, as rightly depicted by Aacharya Charaka (one of the earliest Ayurvedic scholars) – “Pratyakshama hi alpam, analpam apratyakshama” (i.e. what is visible to human beings is only a small fraction of this universe and what we cannot perceive is much more than that, which doesn't make that non-existent). The formulations cited above are in use for centuries and have survived due to the benefits that they offer.

The probable mode of action of *Rasayana* is the direct enrichment of the nutritional quality of *Rasa Dhatu*, promotion of digestion, metabolism and nutrition through improving Agni and enhancement of the competence of *Srotas* (microcirculation). In classics, *Rasayana* has been indicated not only for maintenance of health but also for the treatment of disease. In today's medical practice it has a vital role to serve mankind through improvement in the body-mind-spirit system. *Rasayana* therapy is used to achieve the physical, mental and social well being. Many Ayurvedic formulations have tremendous nutritional benefits. There are many preparations in classics which have not been used in therapeutics which also put forth also challenges for pharmaceuticals. There is also a need for further research and development of these preparations for nutritional supplements.

Also, numerous nutraceutical combinations have entered the international market through exploration of ethnopharmacological claims made by different traditional practices. To truly consume a healthy diet, the vast majority of the diet must be composed of health-promoting foods and nutraceuticals but disease-promoting foods or junk food must be avoided. Ninety percent of the daily diet should be made up of nutrient rich plant foods, whose calories are accompanied by health-promoting phytochemicals, vegetables, fresh fruits, beans and legumes, raw nuts, seeds, and avocados, starchy vegetables and whole

grains. These foods or nutraceuticals construct a health-promoting, disease-preventing diet with protective substances. The rich nutrient food intake will provide maximum protection against not only infections, asthma, and allergies but also against heart disease and cancer in adulthood.

Recommendations

Promotion of Ayurveda Nutraceutical Supplements in education and practice all over the country. Education policy should incorporate Ayurveda Nutraceutical Supplements. Industrial initiatives– Ayurveda Nutraceutical Supplements and pharmaceuticals. Development of formulations and assurance of quality standards. The conservation, development and sustainable management of medicinal plants in a planned way by government and private sector with proper coordination is needed. Initiatives to promote Ayurveda Nutraceutical Supplements industry for private sectors is required. Regulatory mechanism for Ayurveda Nutraceutical Supplements i.e., education and practice need to be incorporated. Regulation and quality control of Ayurveda Nutraceutical Supplements should be done in an effective way .Good clinical practice guidelines for Ayurveda Nutraceutical Supplements should be formed.

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