# **"IMPORTANCE OF NUTACEUTICALS IN DIET THERAPY" - A REVIEW**

# A PROJECT SUBMITTED TO NIRMA UNIVERSITY

In partial fulfilment of the requirements for the degree of

Bachelor of Pharmacy BY PATEL ALISHA R. (16BPH004) BPHARM SEMESTER VIII

UNDER THE GUIDANCE OF DR. HARDIK BHATT



INSTITUTE OF PHARMACY NIRMA UNIVERSITY SARKHEJ-GANDHINAGAR- HIGHWAY AHMEDABAD-382481 GUJARAT, INDIA APRIL 2020

#### **CERTIFICATE**

This is to certify that "IMPORTANCE OF NUTRACEUTICALS IN DIET THERAPY" – A REVIEW is the bonafide work carried out by PATEL ALISHA (16BPH004), B.Pharm semester VIII under our guidance and supervision in the Institute of Pharmacy, Nirma University, Ahmedabad during the academic year 2019-2020. This work is up to my satisfaction.

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## **CERTIFICATE OF SIMILARITY OF WORK**

This is to undertake that the B.Pharm. Project work entitled "IMPORTANCE OF NUTRACEUTICALS IN DIET THERAPY" - A REVIEW Submitted by PATEL ALISHA(16BPH004), B.Pharm. Semester VIII is a bonafide research work carried out by me at the Institute of Pharmacy, Nirma University under the guidance of "Dr. Hardik Bhatt". I am aware about the rules and regulations of Plagiarism policy of Nirma University, Ahmedabad. According to that, the research work carried out by me is not reported anywhere as per best of my Knowledge.

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#### DECLARATION

I, PATEL ALISHA (16BPH004), student of VIII<sup>th</sup> Semester of B.Pharm at Institute of Pharmacy, Nirma University, hereby declare that my project entitled "IMPORTANCE OF NUTRACEUTICALS IN DIET THERAPY" – A REVIEW is a result of culmination of my sincere efforts. I declare that the submitted project is done solely by me and to the best of my knowledge; no such work is done by any other person for the award of degree or diploma or for any other means. I also declare that all the information was collected from various primary sources (journals, patents, etc.) has been duly acknowledged in this project report.

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Thank You.

ACTS + LA Author PATEL ALISHA

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#### <u>ABSTRACT:</u>

Nutraceutics is a new stream of Pharmaceutical science which deals with the usage of natural products in maintaining normal health and in the treatment of numerous diseases. It also includes the prime role of nutrients in human body alongwith the nutrition during an important life cycle of a woman that is pregnancy, and stress and the diet required in certain diseases. Nutraceuticals are the substances which have been used as medicine, not simply as fuel. Any nutraceutical commodity can be described as an beneficial biochemical substance or offers protection against serious illness. Using nutraceuticals can improve health, delay the cycle of aging, resist chronic conditions, boost average lifespan or boost the form or functioning of the body. Nowadays, nutraceuticals have attracted significant attention because of their dietary, environmental and clinical effects.

### **INTRODUCTION**

Many dietary supplements are available at the medical shops, open market and health shops without a medical prescription. The concept of nutritional medicine came into the researchers' mind because of thinking about deficiency diseases and their treatment. Nutraceuticals deal with natural products used for the maintenance of proper health. They are accepted widely because of their simplicity of manufacturing process and less toxicity.

"An Apple holds the doctor off one day" is now replaced by "A nutraceutical one day keeps away the doctor." When pharmaceuticals fail, more customers turn to food supplements to boost well-being. The active principle of causing the beneficial effects of nutraceuticals in various human ailments is phytochemicals.

### *<u>SOURCES OF NUTRACEUTICALS</u>:*

Nutraceuticals are also known as functional foods, phytonutrients and antioxidants. Nutraceutical is generated from 'nutrition' and 'pharmaceutical' which means food extracts can be utilized as preventive medicines. Active foods of this type cover everything from cereal pumped full of vitamins to benecol, a cholesterol-lowering margarinesque spread. All the vegetables like carrots, ginger, and beetroots, bulbs of alliums and cabbage, tomatoes, papaya, grapes, brinjal, bittergourd are included. Among the spices black pepper, cloves, cardamom, green pepper are included and among the leaves amaranthus, moringa, spinach, broccoli, etc are included.

Usually, crops with large portion of nutrients and modest amounts of waste materials including peels, seeds and stones are distinguished from the temperate zone while the processing of tropical and subtropical fruits results in significantmente higher by products ratios. A that problem is raised as the plant matter is usually exposed to infectious spoilage due to the increasing production disposal, thus limiting further use. So while the shipping costs for processing, transport or by-products are economically limiting. Agribusiness wastes are also used as feed or as fertilizer.

- CLASSIFICATION OF NUTRACEUTICALS: The major phytonutrients that possess nutraceutical properties include terpenes, phytosterol, polyphenols, flavanoids and theols.
- 1) **Terpenes:** They are the most important phytonutrient category by far and are found in green vegetables, ginger, soy products and grains. The two major terpene subclasses are Carotenoids and limonoids. Its purpose is to act as a precursor of vitamin A and to take preventive action against many eye diseases. We also keep vitamin A, C, and E from oxidizing so that these vitamins maintain higher blood levels too.



2) **Phytosterols:** They are present in the plant products which are water soluble and lather forming. These compounds come under the group of saponins that are present in different parts of the plants like bark, leaves, rhizomes and fruits. Rich sources of phytosterols include yellow vegetables, seeds of pumpkins and yamas. Saponins are found in abundant amount in soyabeans. The people who consume soyabean based meat substitute are at decreased risk of breast and colon cancer.



**3) Polyphenols:** In preventive medicine they constitute a wide number of phytonutrients of great significance. Tea, fruit, grapes and plants made with eggs are rich in phenolic stuff. Phenols can be toxic only if it contains a single hydroxyl group such as in carbolic acid. When the number of phenolic groups increases they are called polyphenols as in tannins, catechins and reserveratrol of red wine.



4) Flavanoids: They are similar to polyphenols but have an oxide ring in particular and all of them develop antioxidant activity like vitamin E which is also active because of its phenolic group. The herb pueraria lobata produces isoflavones which can be used in drug treatment to modify the Velocity at which intoxication dehydrogenase enzyme transforms To aldehyde alcohol. Out of this good alcohol tolerance is induced, and the response of pleasure to drinking is also reduced.



**5) Theols:** They are a class of sulfur containing phytonutrients with antioxidant activities. The origins of food Include vegetables such as garlic, onions, mustard and other cruciferous vegetables such as cod and turkey. They help in activation of liver detoxification enzymes and can reduce tumour.

**Diallyl-disulfide** 

#### TERPENES AND TERPENOIDS IN FUNCTIONAL FOODS

Terpenes and Terpenoids are considered as one of the most important classes of bioactive compounds in plants, in particular spices. They are classified as **Monoterpenes**, **Diterpenes**, **Triterpenes**, **Tetraterpenes**, **Sesquiterpenes**, etc.

Terpenes as a class posess antioxidant, vasodilatory and anti-inflammatory properties.

Examples of Monoterpenes: Cineole is monoterpene oil from Eucalyptus Species and Pinene from Pinus species. Paeoniflorin is a monoterpene oil derived from Paeonia lactiflora

Terpenoid constituents possess antifungal and antibacterial properties.

- Cardamom seeds show aromatic, sweet, acrid, cooling, carminative, stimulant, cardiotonic properties.
- Cardamom is even used as an ingredient in the treatment of asthma, bronchitis, haemorrhoids, cardiac disorders, anorexia, rheumatism, etc.
- Many spices are being added to food as preservatives. Food products combined with cardamom, cinnamon and clove powders or their volatile oils at concentrations between 1.5 and 2 times their levels are appropriate for human food.
- According to the report, the antioxidant potency of Through growing, clove, cardamom and cinnamon powders and their volatile oils developed food concentrations.
- Therefore, Clove powder was the most effective antioxidant compared to the other two.

### Analgesic and Anti-inflammatory Activities of Cardamom oil

A research on the analgesic activity of cardamom oil i.e., the application of pbenzoquinone as a biochemical stimulant showed a treatment of this pbenzoquinone at 233 microliters / kg in mice provided 50% write protection due to 0.02% p-benzoquinone solution intraperitoneal delivery.

Another analysis of its anti-inflammatory function, extracted from Ellettaria Cardamom seeds, was carried and available treatment of carrageeninduced oedema in male Albino rats at 175 and 280 micro-liters per kg of and 30 mg / kg of indomethacin, which have been shown to be effective.

### Limonene and some other Citrus Oils

- Limonene is known to be the precursor of monoterpenes in mints, mentha spp including carvone and menthol.
- > It has antitumour effects on mice.
- It has been found that limonene, terpentine and other terpene hydrocarbons have low-dose antiviral properties.
- > They are used as nasal decogenstants as well.
- Alpha pinene and beta pinene are commonly distributed in plants, with high concentrations of turpentine oil from various pinus species.
- P-cymene, Mycrene and alpha-phellandrene are present in many spices with biological effects like antioxidant and antitumour activities.

### Pulegone, Thujone, Camphor and Carvone

- > These are monoterpenoid ketones with one or two cyclic structures.
- ➢ In high doses they may cause toxicity.
- > They are present in oils like spearmint and fennel.
- > Ketone volatile oils are mucolytic and congestion-friendly.
- Carvone isomers are found in the soearmint and caraway seeds whereas Arbor Vitae, Thuja occidentalis, was originally isolated from Thujone.
- Pulegone is found in Pennyroyal oil and camphor is derived from the heart wood of camphor laural and even in some lavender varieties.
- Camphor is a CNS stimulant but it can be used mainly as a topical agent for antipruritic, mucolytic and rubifacient tis, which can also be toxic in high dosages.

Monoterpenes is the compound class which is Allocated extensively in a number of fruits and essential oils. Terpenoid derivatives are recognized as one of the most important chemical groupings in the field of prevention and treatment. Limonenes present in citrus fruits and perillic acid have been used and tested in phase I cancer clinical trials. Some studies also suggest that monoterpenes are good immunomodulators and possess antimetastatic activities.

### **Radioactive Effects of Terpenes**

In a recent study by Ralph and Kuttan it was shown that the protective effects of some of the monoterpenes against a sublethal dose gamma radiation- induced damages in experimental mice

- > 5 groups of mice were taken in the experiment with 10 animals in each group.
- First three Organizations of 100 micromoles / kg of body weight were treated with carvone, limonene and perillic acid respectively for the previous two and a half doses for the final sample.4<sup>th</sup> group was treated with vehile-control, parqaffin oil daily and 5<sup>th</sup> group was kept as radiation treated control.
- > A single sublethal dose of radiation was administered in both classes.
- Medications were intraperitonially provided from the same day of radiation and proceeded with all tests with 10 straight days.
- Blood was obtained from the vein of tail region and certain parameters were reported prior to radiation exposure, For example total WBC amount, difference count, Hb material, body mass and continued for 30 days every 3rd day.
- Intestine, liver, bone marrow samples and blood from 6 animals of each group were collected after 48<sup>th</sup> hour, 7<sup>th</sup> day, and 10<sup>th</sup> day of radiation, ALP, ALT and TBARS values of blood, GSH and TBARS values of liver and GSH values of mucosa of intestine were estimated.
  - ✓ It was found that administration of terpenes increased overall WBC numbers, cellularity of the bone marrow and healthy alpha esterase cells, which were lowered after the radiation exposure.
  - ✓ It was also found that the elevated levels of liver and serum lipid peroxidation and serum ALP in the irradiated animals were significantly lowered by the treatment.
  - ✓ Differential count and Hb levels were not altered significantly in any group during the tests.
  - ✓ GSH levels were increased by the treatments which were very low after irradiation.
  - ✓ Among the terpenes, carvone was found to be the least active and other two were more or less equally active in ameliorating the damages induced by radiation in the body (Limonene>Perillic acid>Carvone).

Monoterpenes that were used in the study have clearly proved their proliferative immunomodulatory and stem cell function. Protection to body was assured through an increment of GSH in the tissues on treatment by the monoterpenes. Moreover, this study elucidates the role of monoterpenes as Nutraceuticals. These compounds are nontoxic nutritive ingredients that are present in various fruits and essential oils consumed by us. Thus, the importance of these compounds as dietary components is high.

In another work by the above team the beneficial effects of C57BL/6mice limonene generated by B16F10 melanoma cells on lung metastasis.

- Limonene administration significantly decreased metastatic tumor nodule development by up to 65% for 10 days.
- Results also associated with metabolic variables such as serum sialic acid, pulmonary collagen with hydroxyl proline, and uronic acid content.
- These findings suggest that limonene can prevents metastatic development of melanoma cellsB16F-10 of mouse with concomitant decression of lung fibrosis, glycosaminoglycans and sialic acid serum.

Limonene's chemopreventive activity Might be through induction Owing to activation of phases I and II with the subsequent detoxification of carcinogenic agents. Throughout evolution, this development of Limonene may be due in part to inhibition of post-translational growth isoprenylation regulating small G proteins. In elderly patients, both perillic alcohol and limonene are tested in phaseI clinical trials.

#### PHYTOSTEROLS PRESENT IN FUNCTIONAL FOODS

Plant sterols or Phytosterols are similar to cholesterol according to its structure. Campesterol, stigmasterol, and beta-sitosterol seem to be the most prominent Phytosterols. Some laboratory and observational studies indicate that dietary phytosterols provide colon, breast, and prostate cancer defence. These studies have included the impact of phytosterols Signal transduction pathways controling apoptosis, tumor development, immune function of the host and metabolism of the host cholesterol on membrane structure and tumor and person's tissue function.

Phytosterols For certain animal products are the equivalents of cholesterol. They are similarly formed to cholesterol and include a side chain, a double bond and methyl or ethyl ring. The best nutrition sources of Phytosterols are unrefined plant oils, nuts, legumes and seeds.



#### Anti-cancer properties of Phytosterols

In general increased expansion of colonic mucosal cells that is hyperplasia accompanied the emergence of colon cancer. The disease is known to contribute to colon cancer growth.

- The impact of diet phytosterols on the recruitment of colonocytes in rats and mice have been investigated by several examiners.
- According to these findings, the proliferation of cells has been induced by the use of Dietary cholic acid and regulated by the use of H-thymidin or bromodeoxy uridine.
- A combination of 1-2% phytosterols containing The highest concentrated weights were: 56% beta-sitosterol; 28% campesterol; 10% stigmasterol; and 6% dihydrobrassicasterol democratization of hyperproliferation of colonocytes caused by cholic acid for 22 days.

### In vitro studies:

- In vitro experiments using proven Rows of human tumor cells showed an Beta-sitosterol inhibitory effect on the development of HT-29 cells in tumours with a beta-sitosterol supplementation of 16 micromoles / L for 5 days.
- The highest dose of beta-sitosterol used was above its range of solubility and within the spectrum of metabolism in the blood.
- Specific findings were obtained in HT-29 cells but 16 micromole / L of betasitosterol in Cell line LNCaP for human prostate cancer were observed at a lower magnitude.
- ➤ In development, Tumor cells produce prostate and acid phosphate specific antigen, which metastasize nude which SCID mice.
- Hence, it provides a novel paradigm for researching in vitro human prostate cancer.
- Beta-sitosterol was considered successful in reducing tumor growth and was assessed as a reduction in media cell count and PSA production.
- > The only two phytosterols found in the blood were beta-sitosterol and campesterol.
- Sixteen micromol / L of campesterol and cholesterol were found to have no effect on tumor growth in these trials, but the same amount of beta-sitosterol inhibited tumor growth by 66-80% after 3-5 days of supplementation.

### In vivo studies:

- > There was no more work done on in vivo the tumor growth and metastasis effects of phytosterols.
- Not much in vivo research has been performed on the tumor growth and metastasis effects of phytosterols.
- ➢ Upon eating the diet for 15 days, Mice with MDA-MB-231 cells is xenografied and tumor growth was tracked regularly.
- Around 33 percent of mice fed phytosterols had lower tumors and 20 percent lower metastasis than those fed cholesterol after 8 weeks.

Beta-sitosterol dietary therapy at 60 mg / day for 6 months indicates improvement in the clinical effects of Hyperplasia prostatic in humans. This mild situation does not lead to prostate cancer prevalent in many older men, which leads to reduced urinary discharge and polyuria due to the gland expansion.

#### **CAROTENOIDS IN FUNCTIONAL FOODS**

Carotenoids are tetra Terpenes and more than 600 varieties of them are present in nature, supplying fruit and vegetables with red, orange and yellow pigmentation. Some of them are alpha- and beta-carotenes, which function as provitamins. They are long chain hydrocarbons with conjugated double bonds.

- O Lycopene is a deep red tomato pigment and other pink and purple fruits and vegetables.
- It is considered as the prototype of carotenoids and has a simple acyclic structure.
- O They Are a community of lipid soluble antioxidants focused around the skeleton of carbon of an isoprenoid.
- O Beta-carotene is the most common, But the membranes and lipoproteins can contain at least 20 others.
- O Carotenoids Are vitamin A forerunners which also have beneficial properties but do not depend on oxygen concentrations.
- Carotenoids like lycopene and lutein are biologically active despite having no provitamin
- High serum concentrations of lycopene and a reduced risk of atherosclerosis was associated while preventive effects on cancer and heart disease were also identified.
- O Lycopene is seen as playing a specific role in reducing prostate cancer risk.

#### **Beta Carotene:**

This is a top order anti-aging micronutrient that stands squarely with vitamin C and E and mineral selenium in its ability to minimize illness, enhance lifespan and improve overall health.

It functions as a precursor of vitamin A, and it is called provitamin A. Foods containing beta-carotene are converted to vitamin A for proper skin care, good vision and a strong immune system

A group of strong antioxidants that also includes alpha-carotene, zeaxanthin, lycopene lutein but only alpha and beta-carotene are converted into large quantities of vitamin A in the body is a member of the carotenoid family.

#### POLYPHENOLS AS NUTRACEUTICALS

Polyphenols among the nutraceuticals have a unique position in functional foods like fruits, rhizomes, leaves, bark etc of various plants. Amongst the polyphenols, tannins represent the largest group. Originally isolated from the bark and isect galls of oak trees, they are widespread in the bark, leaves, stem, insect galls and trees fruits.

Polyphenols are found abundant among other natural food sources, in red grapes and their related products. Both compounds are related to the prevention of illnesses caused by oxidative stress. Grape polyphenols have shown effects, such as endothelial maintenance, protection against LDL oxidation and increase in antioxidant capacity.

- Recently, Secondary metabolite work with health-promoting consequences in the fight against or stagnation of For example, serious and congenital diseases such as cancer, cardiovascular problems and neurodegenerative disorders find phenols and polyphenols widespread and generally abundant in plant-based dietary products to be beneficial for human health.
- It should be mentioned that mere polyphenols and their herbal or food compounds have been found to carry out both anti-and pro-oxidant activities implying potential chemopreventive efficacy while also highlighting their ability to trigger apoptosis, growth arrest, inhibition of DNA synthesis and regulation of signal transduction mechanisms in various ways.
- Importantly Comprehensive Knowing the phenolic and polyphenolic composition of food organisms, which are still their indispensable and worthwhile source of discovery, is an significant challenge which can and should be preferred currently in the knowledge that the bioactivity of a herbal extract is often in its chemical makeup.

#### NUTRACEUTICALS VS DISEASES

#### **Role of Nutraceuticals in Diabetes Control:**

Conventional treatments Available as synthetic medicines, the therapeutic needs for diabetes care are not sufficiently fulfilled, and herbal medicines have greater therapeutic hope and, most importantly, reduced side effects. Nutraceuticals are considered to be one of the Un-specific bio treatments which include natural ingredients, supplements, nutrients, calcium, proteins and lipids used to facilitate wellbeing, avoid cancerous activities and manage the effects. Nutraceutical products include medical multidimensions effects as well as effective virtues to prevent, treat and encourage safety have been reported. Hypoglycaemic medicines are commonly used in many mainstream medical systems to avoid diabetes mellitus and diet restriction is necessary for obese patients, IHD patients, DM patients and the patients with hyperlipidaemia.

Diabetic melitus Is a dynamic metabolic condition linked to the development of insulin hormone tolerance, compromised insulin receptors and Betacell abnormalities, irregular lipid and carbohydrate metabolism, subclinical inflammatory and elevated oxidative damage

Diet is the largest modifiable factor amongst various danger factors underlining the incidence & development of type 2 diabetic melitus.

Many epidemiological studies have shown that deit rich in foods with high phytochemical substance, overall high antioxidant ability, as well as polyphenolic compounds can be correlated with lower diabetes risk and predisposing factors.

### \* Antioxidant of vitamins

Several animal research have found sufficient antioxidant may avoid or postpone diabetes complications, including kidney & neurological disorders by giving protection toward oxidative damage

### Vitamin C

- Vitamin C is a link-breaking antioxidants that specifically scavenges ROS & prevents a spread of link reactions which would may contribute to a decrease of proteins glycaetion..
- In animal, it also decreases the accumulation of sorbitol and lipid peroxides in the erythrocytes caused by diabetes.
- About 800 mg / day of vitamin C partly replenishes amounts of vitmin- C in patients of Type two DM and reduced levels of it but may not boost the condition of epithelial impairment or tolerance to insulin.

### Calcium&vitamin D

- One of the major retrospective trials to investigate the function of regular intake in diabetic incidence defined high calcium consumption as protective; people in the upper quintilie of Ca+2 intake, as opposed to that in the lower quintilie, was thirty percent less likely to expand diabetic during six year obey-up span after the adjustment of numerous possible confuters.
- > Interestingly, this lead has not been followed by any subsequent research.
- Few longitudinal studies have explored the effects of chronic consumption of vitamin D for the risk of diabetes.
- But, there are some conceptual reasons for suspect that healthy Ca+2 / vit-D status will help maintain insulin sensitibity by suppressing the secretion of parathyroid hormone (PTH) and thereby help avoid diabetics.

### Vitamin E

- > It is an important fat soluble vitamins which mainly acts as antioxidants.
- Low rates of vitamin E is correlated with elevated occurrence of diabetes, although some evidence suggests lower rates of antioxidants in diabetic people.
- More research also suggests that diabetic patients could also have higher needs for antioixidants as the production of free radicals rises.

### **Carbohydrates**

- They are energy substrate associated with the largest effect on degree of glycaemia.
- ➤ While the overall quantity of carbohydrate is the key driver responsible for subprandieal reaction, there are many factors that may play an important role, such as carbohydrate form, fiber richness, cooking methods, maturity stage, etc.
- Most of the research favor the individualisation of the allocation carbohydrate intake agreeging that the diet must include carbs in the form of bananas, grains, beans, dairy products, potatoes and root vegetables however no lengthy-term trials seem to have beneficial impact on glycaemia.

#### <u>Fats</u>

- ➢ A number of studies indicate heavy-fat intakes that affect insulin sensitivity and encourage atherosclerotics obesity, hyperlipidemia and cardiovascular disease.
- The same metabolic defects have also shown to be reversed or enhanced by reducing saturated fat intake.
- Some of the general population's guidelines on fat consumption apply similarly to Those with diabetic:. saturated fats to ten percent or less of overall power consumption and decrease three hundred mg / d or less of saturated fat intake.
- Evidence Evidence indicates that polyunsaturated fat like soybean, coconut oil and peanuts products in certain patients with diabetic can have protective effects on fatty acids and glyceamic regulation;

#### <u>Fibers</u>

- Food abundant in fiber, like fruit and veg, is also suggested; specific note is created. of the whole grain
- The preventive impact of fibers on some illnesses is well established and the efficacy of fibers is observed in fat and glyceamic metabolites.
- For men and women, consumption of 25 g / day and 39 g / day is usually advised and no need to to raise fiber in patients with diabetes.

### <u>Chromium</u>

- > A contributing factor that in individuals with diabetic can be defective.
- It was proposed that molybdenum supplementation can rise insulin sensitivity and enhance carbohydrate sensitivity in patients with type 2 melitus.
- A genre-analysis of observational studies evaluating the impact of molybdenum supplements on carbohydrates and insulin response in people who are healthy and those with diabetic found a small yet substantial increase glyceamic regulation in the latter though not in former.

#### <u>Magnesium</u>

- Epidemiological studies relate intakes high in Mg to lower incidence of diabetes, with an inverse association between Mg consumption & fasting insulin rates, suggesting an rise in insulin resistance.
- This opinion is backed By Therapeutic Restriction evidence and animal research showing that magnesium helps to maintain the sensitivity of adipocyte insulin.
- In particular Retinae is especially susceptible to oxidation harm due to the accumulation of monounsaturated lipids present primarily in easily oxygenated external neuron membranes.
- Age-related eye disease research studied dietary treatment for maturity levelrelated retinopathy, which showed twenty five percent decrease in the probability of early AMD development among individuals who also had AMD and obtained heavy-dose Zn and antioxidant formulations.

#### <u>Vanadium</u>

- Some work suggests that such a element is close to insulin when carrying sugar in the cells and is thus therefore useful for type 1 and 2 diabetic melitus.
- Fasting rates of blood sugar, hemoglobin A1C and cholestrol 50 decrease in Vanadium supplementation.
- Doses range 50 to 160 mg / day may be helpful to increase the amount of fasting glucose, i.e. this much glucose is in the body fluids when you wake up the next morning.
- Toxicity tests suggest that such dosage levels are healthy and well accepted by most users, while certain people report moderate digestive discomfort, often during the 1st month of usage or at dose levels up to 410 mg / day.

### <u>Protein</u>

- ➢ Some research suggests that individuals with diabetes have comparable protein requirements to that in the general public approximately 0.867 g / kg average.
- While protein plays an important role in promoting excessive insullin release intakes, it must be prevented as it can lead to pathogenes of diabetes nephropaethy.
- There are various Forms of protein supplements, including fluid supplements, & protien powder.
- Variety of sources of protein supplement that include: maize, soy protein, corn, and potato.

### Coenzyme Q10

- A value of this nutrient must not be overestimated as Coenzyme Q10 is exhausted by many of the medications used to treat diabetes and its complications.
- At least for subjects with hypertension, it is a successful dietary therapy for insulin resistance.
- According to a review, a · Dual-blind analysis evaluating the usage of a liquidsoluble form of CQ10 to a vit b compound in 59 hypertension patients & CQ10 findings showed lower levels of glucose and fasting insulin at this dose indicating an increase in insulin resistance.

## \* Anti-diabetic claims of herbs

Name of plant	Common Name	Mechanism of Action		
Acacia arabica	Babul	pancreatic beta cellsrelease insulin hypoglycemic condition		
Allium cepa L.	Onion	Reduces blood glucose levels & strong antioxidant		
Aegle marmelos	Wood Apple	It improves the use of glucose molecules		
Aloevera Burm.f.	Aloe	Maintains homeostasis of glucose		
Allium sativum	Garlic	Has high thiol-containing hypoglycaemic proteins activity and rapid reactivity		
Annona squamosa	Sugar Apple	Depletes blood glucose level		
Azadirachta indica	Neem	Hinders the role of glucose regulation epinephrine contributes to increased peripheral glucose usage and demonstrates hypoglycemia without influencing serum cortisol level.		

Coccinia indica	Ivy gourd	It suppresses glucose synthesis by suppressing the primary Glucose-6- phosphatase enzymes and fructose-1,6-bisphosphatase.
		and also by activating its main enzymeglucose-6-
		phosphate enhances glucose oxidation via shunt pathway.
Casearia	Carilla Fruit	Showcases a substantial
esculenta		Drop in blood glucose,
		reduced glucose-6 and
		fructose-1,6 and increased
		hexocinase liver function
		and heavy hypoglycaemic
		resulting in a reduced rate of
		blood glucose. condition
Catharanthus	Madagascar	Raises glucose
roseus	periwinkle	metabolization and
		increases insulin secretion
Camellia	Green Tea	The available
sinensis		epigallocatechin in tea
		encourages the production
		of insulin and prevents
		stress from oxidizing.

### **Role of Nutraceuticals in Prevention and Treatment of Cancer**

The capacity to minimize the occurrence of cancer is potentially related to apoptosis. Chemoprevention is the method by which small molecules are utilized for the treatment of cancer in contrast to drug medication used to remove or mitigate cancer symptoms. Nutraceuticals are phytochemicals from edible and medicated plants such as soybean, garlic, ginger, tea and honey.

- The biological effect assessment of cellular phytochemicals is a biochemical basis for anti-tumor activity and helps to create a base for successful chemoprevention and chemotherapy production.
- Apoptosis includes many biochemical mechanisms, such as immune reaction, tissue homeostasis, the equilibrium of life and death within a body.
- Therefore, a major position in many physiological disorders and degenerative diseases, including myocardial infarction, atherosclerosis, persistent inflammation and rheumatoid arthritis, cataracts, Alzheimer's and Parkinson's may be taken by destroying these important postmitoscopicneuronal tissue cells as a result of cell death.
- THERE However, a constructive self protection strategy for a living organism can often be implemented for the degradation, without inducing secondary inflammatory, of irregular cells such as precursors to metastatic cancer cells.
- Perhaps the key cause of carcinogenesis is the breakdown of the apoptosis cycle.
- Only dysregulation for proliferation of cancer is not adequate to inhibit apoptotic signals and cancer cells can be found by overexpressing antiapoptotic proteins (Bcl-2, IAPs and FLIP), or by reducing or mutating prooptotic proteins (Bax, Apaf-1, Caspase-8, and death receptors).
- Many cell lines of the lung tuber, cells of cancer of the colon, cells of the breast, prostate cancer cells, brain tumor cells, squame head neck carcinoma and cervical cancer cells have been recorded.
- Caffeic acid phenethyl ester is a strong phenol-based portion of HF-60 leukemic cells and JB6 Cl 41 cells in the mouse epidermal, which blocks the tumorigensis of a two stage model of mouse skin cancer and is known to be subjected to apoptosis in mouse epidermal cells.
- Induces apoptosis of colon cells, tumors, prostate cancer cells, melanoma cell and breast cancer cells. Curcumin causes apoptosis.

Combinatorial approaches may be effective in prevention or diagnosis

Several studies in the past years have focused attention on unraveling the protective properties and mechanistic actions of many phytochemicals.

### **Curcumin and Taxol**

- While primary breast cancer cells are typically handled with medication taxol, continuing chemotherapy with this treatment has also resulted in tolerance to medicine and even development of the tumors.
- > RE Many chemotherapeutic medicines induce NF- $\alpha$ B metastatic gene expression which enables progression of the tumour.
- CIER THE NF-SB gene for meaning has been shown to be inactivated by pharmacologically active natural compounds.
- Taxol has been shown to decrease NF-Fraktion expression and cause apoptosis as an effective cancer therapy drug to avoid metastasis.

### Curcumin and Xanthorrhizol

- The first additive and antagonistic results were induced by addition of curcumin and xanthorrhizol, a rhizomical sesquiterpenoid of Curcuma, in culture relied on the compound first applied to the crop.
- Furthermore, synergistic effects at lower concentrations and agonistic results at higher concentrations arose from the reciprocal application of certain substances.
- Furthermore, the Above Studies give proof that the effectiveness of the drug depends on the cell dosage, duration, and appearance of the medication and outcomes may be contradictory if the doses are purely antagonistic.
- These experiments indicate that the efficacy of the medication depends on the concentration, duration, and delivery of the medication to the cells and that if the doses are solely antagonistic the effects may be inconsistent.

### **Curcumin and Genistein : A Preventive Strategy**

- While even more popular clinical therapy trials have started to emerge, restricted studies have demonstrated that synergistic effects of compounds may be accomplished at much less doses than when compounds are used alone, particularly in hormone-reguled cancers where tissues are frequently exposed to external or internal hormonal exposures.
- Environmental agents which mimic estrogenic effects, that are known to inhibit various types of tumors in vitro and in vivo, which also lead or trigger carcinogenic processes such as curcuminoids and genistein isoflavones.
- T he therapeutic modifications in structure and suppression of growth have, however, greatly impaired production of tumors following administration of such medications, which were also observed in ER-positive and ER-negative cells indicating such a combination for prevention and diagnosis.

### Curcumin and Sulfinosine

- CERS Against extended chemotherapy, certain work has shown resistance to some cancers to be ineffective and is a major barrier to cancer, especially for multi-drug-resistant cancers. Resistance to certain cancer.
- The most widely used medication SF produced through amination in cell cultivations and subsequent 6-thioguanosine oxidation has been shown to suppress cell growth in treating non-small-cell-pulmonary MDR cells, such as NCI-H460/R.
- The successful treatment of the non-small-cell lungs is challenging to locate the MDR phenotype.
- Since limited amounts combined over several levels, the cytotoxicity of the medication curcumina is increased.
- These compounds mediate a synergistic function in cell cycle phase control and decrease in MDR genes, thereby enhancing tumor regression phenotypes, given the mutation of p53 molecules.

#### **Curcumin and Celecoxib**

- ► —Cyclooxygenase-2 (COX-2) is at the center of colorectal carcinogenesis.
- The compounds that regulate the expression of the COX-2 cell that affect the regulation of the impact on tissues or cells of chemotherapy.
- T he Monotherapy therapies are most effective in the avoidance of the growth, advancement, metastasis and invasion of cancers, as seen in various in vitro and in vivo models, after a prolonged exposure in celebracoxib leads to cardiovascular complications.
- Celecoxib is a COX-2 effective receiver intended to work at its working position.
- THROUGH Research on celebracoxib and curcumin activity have demonstrated a synergistic inhibitory impact on colon cells with different COX-2 concentrations.
- THIS study, as in many other in vitro studies, shows that the dose required to reduce successful anticarcinogenic agents with minimal side effects is reduced by the combination of strong drugs and natural, active compounds.

#### **Resveratrol, Quercetin and Catechin**

- The protective functions of the polyphenols are diverse and, as a consequence, numerous experiments have studied their protection and therapy in vitro tumors through the emergence of cellularly incorporated tumors.
- T he Furthermore, few studies identify the functions of combined polyphenols in tumors.
- The actual proportion of biomolecules inside a diet decides the doses of the nutritional serum, and thus enhancing the safety of compounds requires additional dose mixtures which require the same dose levels.
- A combination of all three polyphenols: in vitro and in vivo in situ, resveratrol, quercetine and catechin were found.

### **Role of Nutraceuticals in Prevention of Dyslipidemia**

Dyslipidemia is a concept used to diagnose a number of lipid disorders, which increases CVD risk. Minimizing total cholesterol and lipoproteincholesterol is one of the most effective forms of minimizing first and second CVD incidents. In addition to adding, nutritionals with the ability to affect plasma content have decreased LDL-C levels associated with reduced rates of massive coronary accidents and lipids can also reduce the risk of heart disease.

#### **Sterols/stanols**

- The application of plant sterols / stanols is seen lower circulating TC in human beings since their effect is mainly reduced to LDL-C triglycerides, with little or no effect on high-density lipoprotein cholesterol.
- The mechanism in which LDL-C decreases in sterols reduced intestinal cholesterol absorption, which is the upregu The mechanism through which sterols decline LDL-C is linked with decreased absorption of intestinal cholesterol, that is upregulation of hepatic LDL responses and thus enhanced uptake of hepatic cholesterol through diminished endogenous cholesterol output.
- Since it decreases intestinal cholesterol absorption, its The outcome may be close to that of the statins acting to reduce liver cholesterol production.
- It seems to be understood from The meta-analysis of 15 random study trials found was the case and the mixtures of statins and stanols decreased to a greater degree the levels of TC and LDL-C.
- It was found that the application of sterols to statin therapy did not affect HDL-C and triglyceride levels, but a further A genre-analysis found that when eaten as a calory source and administered as a nutraceutical supplement, the cholesterolelowing efficacy of plant sterols was compared to allow for versatile drug provision.
- There is also Certain confirmation that large levels of plant sterols can be correlated with male MI avoidance of sterol intake in cardiovascular outcomes
- Recent research has demonstrated that natural phytosterol ingestion has been correlated This advantageous positive effect on the lipid profile has never resulted in a reduction in CVD risk with TC and LDL-C, particularly in men.

### **Polyphenols**

- Multiple experiments have shown That fruit polyphenols can have an effect on plasma lipid levels and that elevated HDL-C is correlated with grape juice consumption.
- As per a report on the impact of soluble fibers-rich grape nutrients including 700 mg of cardiovascular events in healthy subjects, TC and LDL-C care, have not been observed at more quantitative meta-analysis of nine supervised randomized trials involving a total of 390 participants.
- Although no results were detected Throughout this mixed population and subpopulation survey and more extensive lipid Examination of large LDL-C and smaller LDL particles as opposed to placebo, was observed in one study where, in grape powder strengthened students, the plasma concentrations decreased over three weeks but the most atherogenic s.
- No evidence of any Influence of this chemical TC, LDL-C, triglycerides or glucose plasma quantities has been observed, even after the latest meta-analysis showed great optimism about the nutritional benefits of the resveratrol treatment.
- Only a slight reduction in HDL-C concentrations has been reported and welldesigned experiments are therefore required to validate these findings.
- Experiments were carried out on the effect of cocoa on lipid profiles is summarised by a narrative-analytics in six randomized controlled trials.
- Short-term cocoa consumption showed a significant reduction 5.87 mg / dL in LDL-C but a slight 5.82 mg / dL drop in TC, with no scientific proof of any consequence on HDL-C concentrations.
- There are a number of cocoa derivatives, although not all of them necessarily have similar biological effects, such as the intake of dark chocolate containing Cocoa butter and cocoa powder were observed in diabetics with hypertension as opposed Dark coconut butter chocolate but not paste with no triglyceride, LDL-C or HDL-C variations classes.
- In past research, the effects of In Stadium 1 hypertension subjects and heart patients, cocoa polyphenols on blood lipids were not observed.

- Latest findings The Health Study reported a 2-day consumption of 450 mg CDF by 0.20 mmol / L and LDL-C by 0.17mmol / L for 1 month, while HDL-C for low-risk key prevention was raised by 0.10 mmol / L purposes community.
- It has been found that Te polyphenols the metaanalytics of 14 randomized trials, which also had lipid lowering effects, for a maximum of 1136 participants, showed that a significant decreases in Serum TC and LDL-C concentrations without altering HDL-C had been achieved when administered or extracted green tea drinks.
- Per Zhao et al. reported further analysis, both green and black teas decreased LDL-C while green tea also decreased TC.
- Thus, in essence, these findings illustrate one of the difficulties of nutraceutical population study, which is minor variations in Preparatory work of foods that are not commonly captured in food intensity survey questions may lead to significant variations in food configuration and could therefore lead to differing biological impacts.
- Á t Black tea that are used in subjects with a hypercholesterolemia and other indicators of risks of cardiovascular disease has been demonstrated to be more effective in decreasing LDL-C.
- According to several recent placebo-controlled study, decreased In stable postmenopausal women after long term therapy with green tea concentrate for up to 12 months straight, LDL-C and non-HDL-C were observed.
- Numerous Results Plasma concentrations of HDL-C in human beings have so far not been affected by the introduction of grapes, cocoa or tea polyphenol, but their LDL-C exact mechanism is not clearly established in terms of green-tea reduction consequences.
- Armolipid Plus is a natural remedy that blends natural products containing red leaven rice, polycosanol, berberinFolic acid, astaxanthine and coenzyme Q10 were reported and to minimize TC, LDL-C and triglycerides through replacement with this nutraceutical supplement.
- As per a very latest genre-analysis of many other observational studies showed that this nutraceutical was stable, well controlled and had positive effects on the Plasma TC lipid profile decreases by 11–21% and LDL-C drops

### <u>Spirulina</u>

- Spirulina treatment was linked with favorable changes in blood lipid profiles such as orally bioavailable spirulina average of 4.5 g / day, with substantial rises in TC and LDL-C for 6 weeks.
- In addition, in the community of entities ingestion of 1 g Spirulina a day with dyslipidemia decreased the average levels of triglyceride for 12 weeks, LDL-C and TC without any major effect on plasma levels of HDL-C. and a latest paradigm-analysis of seven random spirulina experiments has been shown to endorse these findings.
- In addition, Excellently-designed trials are required for this to explain Spirulina supplementation's mechanism of action in dyslipidemia and to evaluate its impact on cardiovascular interventions.

### Role of Nutraceuticals in Hypertension

The risk factor for cardiovascular disease that can be modified is known to be hypertension. The reduction in blood pressure indicates a decrease in 20-25 percent in CV incidence of myocardial infarction, of 35-40% of stroke and of heart failure of about 50 percent, and the proof of antihypertensive impact of such nutraceuticals is described below.

### **Sterols/stanols**

- A remarkable lack of knowledge of their blood pressure impact demonstrates contrast to the well-studied impact of steroles on lipids.
- Several trials have not confirmed antihypertensive benefits of sterols through continuous treatment for a year or longer.
- THERE However, there is still no recent research on potential blood pressure, while limited data seems to suggest little antihypertensive impact of such compounds upon humans and that there is no suggestion of harmful effects on the blood pressure of plant stanol esters.

### **Polyphenols**

- Some work on the consequences are very comprehensive on blood pressure from polyphenols, covering a wide range of polyphenol based foods such as grapes, bananas, sweets, tea and others, although some have shown that grape polyphenols have a major positive impact
- Various studies have not identified such an correlation and hence the conflicting results are likely attributable to the variability of the existence of the study.
- Newly randomized controlled trial reported showing a 5.5 percent substantial decrease in systolic blood pressure after six weeks of grapes seed extract supplementation and a 4.7 percent decrease in diastolic blood pressure.
- The effects Resveratrol blood pressure was also analyzed and six retrospective controlled tests meta-analysis was carried out involving 247 students has shown a higher dose-response relation (i.e. 110 mg daily-1). The systeolic blood pressure of Resveratrol has been significantly decreased no major blood pressure outcomes though have been observed.

- Since the resveratrol introduction the systolic and diastolic blood did not interfere pressures and that variances in specific blood pressures in the subjects of the analysis compensated for any of these differences, the remainder of the metaanalyzing contained results from 10 randomized controlled trials.
- A meta-analysis of 20 monitored randomized studies with healthy subjects identified the usage of polyphenole-enriched cocoa products as being associated with decrease in blood pressure, and it was confirmed that the most researched polyphenols in the clinical are cocoa flavanols. environment.
- However, 42 randomized clinical studies have meta-analyzed the relationship between chocolate or cocoa and lower diastolic blood pressure and normal blood pressure.
- Latest clinical studies have also reported a positive impact of cocoa flavanols for people with type 2 diabetes and blood pressure, elevated blood pressure, and the elderly.
- In comparison to the above-mentioned findings, in patients who experienced mild hypertension there were no signs for an influence of 49 g / day of regular dark chocolate intake on blood pressure or artery rigidity.
- THAT A FLAVIola Health Analysis has shown that cocoa flavanol intakes decreased by 4.4 and3.9 mmHg to 450 mg for 1 month, pulsewave the pace of 0.4 m/s, increased endothelial output in a stable primary prevention population, indicates possible benefits for cardiovascular protection of cocoa.
- Multiple tea polyphenols inquiries recorded decrease in blood pressure and an explanation blood pressure of ten experiments of 834 participants showed a link in black or green tea diastolic blood pressure to a statistically important decrease in systolic blood pressure.
- TREE Several clinical trials have indicated that the pomegranate juice has an antihypertensive benefit and a new meta-analysis has shown that the ingestion, with a large amount of polypheno-rich juice, greatly reduces the systolic and diastolic pressure of the pomegranate juice.

A tin-free, well-tolerated, and effective reduction in the mean systemlic 24 hours, 24 hours pulse pressure of low cardiovascule risks, hypertensive and hypercholesterolemic substances, the nutraceutical druge Armolipid Plus contained rice red leaven, polycosanol, berberine, folic acid, astaxanthine and coenzyme Q10.

### <u>Spirulina</u>

- > According to some reports, spirulina maxima can be antihypertensive.
- Blood pressure decrease was noted for the Greek community after ingestion of 1 g of Spirulina everyday for 12 weeks, but, in the limited clinical study, ingestion of Spirulina oral contributed to the lowering of the systolic and diastolic blood pressure.
- There was no evidence of cardiovascular result and even more excellentlydesigned studies are necessary to show Spirulina supplement therapeutic values for reducing blood pressure, but 2 g of Hai spirulina has been correlated for three months with upgraded blood pressure and endothelial functions in patients with Spirulina complementation. elevated blood pressure,

## **NUTRITION DURING PREGNANCY**

Nutrition counseling is the most important aspect of Prenatal treatment of women during pregnancy since the state of nutrition of a woman affects Not just her health but also the effects of her pregnancy and of her unborn-neonate's health. During pregnancy, all Medical care practitioners need to be mindful of dietary requirements, because they vary substantially from non-pregnant populations. In addition, it is recommended to use an individually tailored Nutrient treatment strategy that examines women's access to healthcare, socio-economic status, raceethnicity and cultural food preferences, and body mass indexSeveral of the recommendations are especially oriented towards uncomplicated births, so improvements need to be made when conditions, such as gestational diabetes, arise so that a nutritionist or licensed dietitian may help facilitate nutritional counseling so initiatives.

### Eating disorders:

Bulimia should also be asked relevant weight-related questions in females with either a history of or ongoing eating disorder such as anorexia nervosa, such as how they feel about weight gain, whether they are weighed at each developmental and continuous physical changes. With respect to the amount a woman's choice of weighing should then be calculated and documented in the table. Treatment on pregnancy weight gain goals is also required in these women, because weight affects the growth and progress of the fetus.

### Vegetarians:

Vegetarian menus, including milk and poultry, ovovegetarians, lactovegetarians, which also include dairy products and vegan foods, which includes meat, dairy products and any other animal products, including bohemian beans, peas, wheat, amands, nut butters and milk and oegg items.

### Common Exposures:

Previous research indicating an increased risk of adverse obstetric effects such as abnormality, poor fetal growth, and stillbirth have been suggested as a result of caffeine. Expectant mothers were still approved for their pregnancy. Increased caffeine intake of less than 200-300 mg / day was indicated, according to current research, not to be linked to higher perinatal danger. Moreover, with rather large doses of caffeine like more that 4 tables of coffee a day, the likelihood of such findings is usually increased. Increased caffeine intake of less than 200-300 mg / day was indicated, according to current research, not to be linked to higher perinatal danger.

## **NUTRITION AND STRESS**

### Stress and food:

That is why the eating of a healthy, balanced diet may be less painful than the ingestion of a poor diet. If you feel so tired, it is possible because your digestive system is exhausted, so your food will be vital for you to feel healthier physically and emotionally.

#### Food affecting the body negativelyduring stress include:

**Caffeine**:That is a drug found in tea, chocolate, soft drinks, and improves our capacity to cope with tension as it serves like a stimulus that allows the sugar glans to produce more hormones, such as cortisol, which are still elevated when under strain on our bodies.

Caffeine may also decrease the magnesium amounts required to generate energy and to increase the absorption of the B vitamins in the body, and enable us to lower the consumption of caffeine and help to understand the importance of caffeine through substituted herbal teas and coffees.

### Foods high in fat and sugar

Their wellbeing will harm to make you bad. Sugar promises brief energy bursts to quick relaxation from nervous thoughts because that can be coupled with low blood sugar rates collapse.: Once you are tired of the diet, there are certain cravings for processed food or candy products.

Researchers find that those with large intakes with fats refined have a 58% higher chance with depression than those that consume whole foods, and that was the same with the analysis of the high consumption of refined fat.

Foods that are refined often produce high hydrogen or oxidized fats that can hinder the development of critical fats required to maintain the cell membrane and nerve safety.

### Alcohol:

Drinking alcohol so much can contribute to drug issues and impair physical safety and well-being. Sleeping disorders, nervousness and irritations on the skin are common side-effects of drinking as alcohol can induce the body to produce more dopamine and increase blood sugar.

#### Stress-relieving foods to eat more of:

#### Fruit and vegetables :

Ingesting a high diet of fresh fruit and vegetables is vital for you to get lots of nutrients and minerals, so your body feels tired and requires more nutrients than normal.

See how to consume at least five servings of fruit and vegetables a day to receive adequate vitamins and minerals, and concentrate on vitamins B, C and magnesium milk.

- B vitamins-Found in bananas, leafy vegetables, nuts, beans, milk items, offer body strength after a period of tension.
- Good vitamin C foods contain bananas, onions, leafy greens and broccoli.• Vitamin C-is used for the development of tension hormones in the adrenal glands.
- Magnesium-This element can help calm muscles and reduce anxiety.

#### Healthy snacks

During the day, consuming nutritious foods such as fruit, fresh veggies, yoghourt, nuts and seeds, managing the blood sugar and having the metabolism running efficiently is important for minimizing hunger increases and falls, especially the intake of a balanced and fulfilling breakfast in the morning.

#### Complex carbohydrates

Eating all the non refined carbs, such as whole grain bread, pasta and grains, as well as oats and brown rice can help to increase the amount of serotonin, which is the mood-enhancing hormone which makes you feel more relaxed and secure.

#### Essential fatty acids

Examples include Omega 3 and Omega 6 which are crucial nutrients which help the body function efficiently. These also help mitigate the effects of psychological and physical stress as these minimize the release of glucocorticoids which are the hormones released under stressful conditions from the adrenal gland.

### Calcium-rich foods

Studies relating to stress and nutrition suggest that calcium can help to relieve certain effects, for example muscle pain and anxiety, ensure that a sufficient quantity of foods high in calcium is provided in the nutrition, such as fatty milk, yoghurt, seseeds, kelp, dairy, leafy green and broccoli.

# **CONCLUSION**:

It can be concluded that nutraceuticals have proven health benefits and prescribed dietary diets can keep illnesses at a distance and enable people to maintain good overall health.While nutraceuticals have played a significant role in promoting human health and disease prevention, health care practitioners, nutritionists and regulatory toxicologists should be working strategically this is why regulatory body implementation is required to standardize the nutraceutical industry.Thus we may conclude that herbal nutraceutical is certainly a effective weapon in preserving good health as well as acting against induced minor and severe illnesses in diet, encouraging optimal fitness, lifespan and living standards.

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### IMPORTANCE OF NUTRACEUTICALS IN DIET THERAPY

ORIGIN	ALITY REPORT				
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