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Nutraceuticals and Cosmeceuticals for Human Beings–An Overview

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Abstract

The nutraceutical has evolved from the recognition of the link between food and health. The major diseases for the prevention and or treatment of which, nutrition have been associated are heart disease, cancer, hypertension and diabetes. Classification of Nutritional: Depending upon various characteristics, nutrition can be classified by several methods. Their major classes can be as under nutraceutical according to food source. Nutraceuticals according to their action of mechanism. Nutraceuticals according to their chemical nature. Nutraceuticals according to their higher contents in particular foods items. Cosmeceuticals are the cosmetic products, which contain biologically active principles or ingredients of plant origin having effect on users, or they are combination products of cosmetics and pharmaceuticals, intended to enhance the health and beauty of the skin. They differ from cosmetics, since cosmetics are the inert substances which cleanse or enhance the appearance of the skin without any therapeutic benefit. Whereas pharmaceuticals are used to treat or prevent the diseases or are intended to affect the physiological structure or function of the body.

Keywords

Nutrition, Hypertension, Chemical Nature, Cosmetics, Skin

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1. Introduction

The concept of generating utility of food as health promoting factor beyond its nutrition value is gaining acceptance within public arena and among scientific community. The nutrition has evolved from the recognition of the link between food and health. Nutrition [1] is defined as a substance which can be considered a food or its part which, in addition to its normal nutrition value, provides health benefits including prevention of disease or promotion of health. The knowledge about the nutritive value of various food items and their basic chemical roles has much increased. Due to this, the values of menu that various societies have adopted around the world have been appreciated. The western nutrition experts believe that the food which offers best value to bodily health is "Mediterranean cuisine". It includes fish, whole wheat bread, tomato, olive oil, salad, garlic, onion, fruits and red wine. East Asian food scores high in its nutrition value and includes glutinous rice, soybean curd, fibrous fruits and tea. The major diseases for the prevention and or treatment of which, nutrition have been associated are heart disease, cancer, hypertension and diabetes. [1] The other diseases, related with role of nutrition are osteoporosis, arthritis and neural tube defects. Certain dietary habits can enhance cancer risk.

Designing a proper food to maintain proper health has gained recognition and acceptance world – wide. Due to this, the food industry in many countries is modifying their products as a response to consumer demands. In recent years, many of the natural products from India are gaining popularity in U.S.A. and Europe as nutraceuticals. [1] The present U.S. market of nutrition is three billion US dollars.

Classification of Nutrition:

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Depending upon various characteristics, nutrition can be classified by several methods. Their major classes can be as under

1. Nutrition according to food source.
2. Nutrition according to their action of mechanism.
3. Nutrition according to their chemical nature.
4. Nutrition according to their higher contents in specific foods items.

Nutrition according to Food source: nutrition is obtained from plants, animals and microbial resources and are restricted to them only. [1]

However the demerit of the system is that little nutrition is found in plants and animals while others are reported in all the three resources. Lenolenic acid is found in animal flesh and also synthesized in plants. Choline and phosphotidyl choline [2] is available in plants, animals and also microbes in listed below the table no. 1.

Table 1. Nutrition from food source.

Plants	Animals	Microbial
Ascorbicacid	Conjugated linoleic acid(CLA)	Yeast
Quercetin	EPA	*Lactobacllus acidophilus*
Capsaicinoids	DHA	*Streptococcus salvaricus*
Lycopene	Choline	
β-Carotene	Lecithene	
Catechins	Ubiqunnone	
Curcumin	Spingolipids	
Ellegicacid		
Anthocyanates		
Cellulose		
α-Tocopherol		
Pectin		
Allicin		
Geraniol		
α-Limonene		

1.1. Nutrition Representing Their Therapeutic Activities

The nutrition representing their therapeutics activities like anti inflammatory, [3] [4] anticancer, bone protective and antibacterial activities is noted the table no. 2

Table 2. Nutrition according to their action of mechanism.

Anti-oxidant	Anti inflammatory	Anti Cancer	Bone Protective	Antibacterial
Ascorbicacid	Curcumin	Genestein	(Osteogenetic)	Garlic
βcarotene	Quercetin	Limonene	Soy-protein	Curcumin
Polyphenolics	Capsaicin	Glycyrrhizin	Genestein	
Tocopherols	Lenolenicacid	Daidzein	Daidzein	
Lycopene	EPA	Dialllylsulfide	Calcium	
Ellagicacid	DHA	CLA		
Luteolin		Sphingolipids		
Catechins		α-tocopherol		
Gingerot				
Glutathione				

1.2. Nutrition According to Chemical Nature

The nutrition in chemical nature for example the phenolic compounds, [3] proteins, isoprenoids, carbohydrate and derived categories, fatty acids and structural lipids, microbial [4] and minerals are noted below the table no. 3.

Table 3. Chemical natures of nutrition.

Phenolic compounds	Protein Based	Isoprenoids	Carbohydrate Derivatives	Fatty acid sandstructural lipids	Microbial	Minerals
Tannins	Choline	Carotenoids	Ascorbicacid	CLA	Prbiotics	Ca
Anthocyanins	Isothiocyanates	Saponines	Oligosaccharides	Sphingolipids	Probiotics	Se
Isoflavones	Capsaicinoids	Tocopherols		Lecithin		K
Flavonones	Aminoacids	Simple-terpenes	Non-starchproducts	N3PUFA		Cn
Flavonols	Indoles	Tocotrienols		MUFA		Zn
Coumarins	Folate					
Lignin	Allylthio-compounds					

1.3. Nutrition According to Their Higher Contents in Specific Foods Items

The nutrition since specific food items noted the table number 4.

Table 4. Nutrition since specific foods.

Nutritional	Name of specific food
EPA&DHA	Fishoils
Lycopene	Tomatoes and tomato products
Isothiocyanates	Vegetables of crusiferae family
CLA	Beef and dairy products
Isoflavones	Soyabean and legumes
β-Carotenes	Carrots, pumpkin
Curcumin	Turmeric
Catechin	Tea, berries
Quercitin	Citrus fruits, red grapes
Allyl sulfer compounds	Garlic, onion

The food substances used as nutrition contain antioxidants, prebiotics, probotics, omega – 3 fatty acids, certain phytochemicals and dietary fibers. Except probiotics, all these components are present in fruits, vegetables and different types of foods.

2. Antioxidants

Antioxidant nutritional are those which contain vitamin E, vitamin C, vitamin A and beta – carotene. They are present in some fixed oils, fruits, vegetables and fishes. Antioxidants present in such food are those compounds which either prevent the formation of oxygen free radicals or trap them (scavenging effect). [3-4]

Anti – oxidants or inhibitors of oxidation are compounds which retard or prevent the oxidation and in general prolong the life of the oxidizable matter. The reactive oxygen species (ROS) in the body, include superoxide anion, singlet oxygen, hydroxyl radical and hydrogen peroxide. The oxidative damage initiated by these is propagated by lipid per oxidation which may cause further damage to DNA. [2-3] The body defense system against the oxidative damage consists of enzymes such as superoxide dismutases, glutathione peroxidase, catalase and the reducing agents such as glutathione, ascorbate and iron.

Various theories have been reported to explain the role of antioxidants in treating disease. In general the reactive oxygen species circulating in the body tends to react with the electrons of other molecules in the body and these also affect various enzyme systems and cause damage which may further contribute to conditions such as cancer, ischemia, aging, adult respiratory distress syndrome, rheumatoid arthritis etc.

Through various studies it has been reported that the free radical is the cause for cytotoxicity, alternation of enzymes and nucleic acids and per oxidatation of lipids which altogether result in loss of cell membrane integrity and in turn cause aging. [3-4]

Through various studies it has been reported that the free radical is the cause for cytotoxicity, alternation of enzymes and nucleic acids and per oxidation of lipids which altogether result in loss of cell membrane integrity and in turn cause aging.

Some of the naturally occurring anti – oxidants which could be of therapeutic use are super oxide dismutase (isolated or recombinant), tocopherol, ascorbic acid, adenosine, transferring, lactoferrin, glutathione and its precursors, carotenoids and other plant pigments, deferoxamine.

Antioxidants play a vital role I the life of a living being. S-allyl cystine sylphoxide (SACS) from garlic and disulphides may act by scavenging free radicals. They have also shown hypolipodemic action. Various organic compounds with phenolic hydroxyl groups have shown antioxidant activity by scavenging free radical or by metal chelation. [3-4]

Vitamin E (tocopherol) is a major radical trapper in lipid membranes and is found clinically useful in cardiac damage and carcinogenicity. Selenium is an important dietary anticarcinogen. It is present in the active site of glutathione peroxidase enzyme, which is essential for destroying lipid hydroperoxids and thus prevents oxygen radical induced lipid per oxidation. Dietary ascorbic acid is an effective scavenger of superoxide radicals and is found in high concentrations in the eye and ECF (Extra cellular fluid) of lungs.

Generally, per oxidation of lipids leads to formation of free radicals wcih cause detrimental effects on various tissues and organs of body. They may cause mutation and consequently caner. They are also known to be involved in aetiological sequences of diseases like atherosclerosis, arthritis and aging process. Besides per oxidation of lipids, there are some other factors leading to formation of free radicals, including excessive alcohol consumption, environmental pollutants, excessive sunlight, etc.

The oxidation of LDL-cholesterol increases the chances of atherosclerosis. Antioxidants like tocopherols in vitamin E lower the susceptibility of LDL for oxidation. Tocopherols also reduce platelets role in thrombus formation. Corn oil, wheat germ oil are rich sources of vitamin E. various plant materials like amla, myrobalan, lemon contain an antioxidant in the form of ascorbic acid (vitamin C). it prevents both the formation and scavenging of oxygen free radicals. Bet-carotene and vitamin A have shown to cause antioxidant effects and immune enhancement.

3. Poly- Unsaturated Fatty Acids (PUFA)

They are present in various vegetable oils and marine animals. These sources include safflower oil, corn oil, mustard oil, soybean oil, etc. They help to reduce cholesterol formation/deposition. These vegetable oils mainly contain PUFA belonging to linoleic group (omega-6type). Some marine fishes contain PUFA belonging to linolenic group (omega-3 type). The later are found to appreciably reduce thromboxane formation and hence useful as preventive measures for atherosclerosis. In spite of high consumption of fats, Eskimos have rarely shown any evidence of atherosclerosis. The reason identified has been their consumption of such cold water fish oils which contain appreciable quantities of omega-3 fatty acids.

4. Probiotics

These are the living microorganisms, which when taken with or without food, improve the intestinal microbial balance, and in turn, functioning of the large intestine. Probiotics include Bifidobacteium and Lactobacilli species such as L. acidophilus. These microorganisms exert their effects by producing substances and conditions which inhibit the growth of harmful bacteria in the large intestine. The dairy products like sour milk and A/B-culture yoghurts contain these probiotics.

4.1. Prebiotics

They are the nutritional which promote the flourishing of probioics. Before reaching to colonic region, the probiotic microorganisms have to survive the digestive enzymes and acids in the upper gut. To overcome this problem, nutritionalin the form of preiotics are available. Prebiotics are the food substances which reach to colon in intact form, without getting depleted by gastric pH and digestive acids. Prebiotics also selectively promote the growth of colonic probiotic bacteri. At present, the best known prebiotic is inulin. It is a polyfructose obtained mainly from raw chicory (roots of Cichorium intibus) or Jeruslem Artichoke. Chicory is reach in fibrous polysaccharide inulin. It is a soluble dietary fibre and resistant to digestive enzyme. It reaches to large intestine or colon essentially intact, where it is fermented by the resident bacteria. Lactobacilli and Bifidobacteria digest inulin and feed themselves on it. Hence, prebiotics act as fertilizers for these symbiotic bacteria. Inulin also serves the role of dietary fibre. Safety of inulin has been evaluated and accepted by FDA of United States.

4.2. Dietary Fibers

Fibers are non-digestible polysaccharides found in plant cell walls. They are present in food including fruits, vegetables, grains and legumes. Thus fibers which we eat are called Dietary fibers.

There are two types of fibers: the soluble and insoluble dietary fibers. Soluble fibers are partially soluble in water and form gel while insoluble fibers are insoluble in water and pass through the digestive tract largely intact. Both types of fibers are very important in the diet and provide several benefits to the digestive tract by helping to maintain regularity. Soluble fibers are more beneficial since they reduce blood cholesterol levels and also reduce the risk of heart attack.

Dietary fibers can be distinguished by their viscosity, water binding properties (fecal bulking) and fermentbaility. Viscosity is essential to regularize the blood glucose and also to reduce the quantity of bile acids re-absorbed. Insoluble fibers due water-binding property reduce their transit time in large-intestine, which promotes regularly and reduces the chance or colon cancer by decreasing the time of exposure of colonocytes to potential carcinogenic metabolites. Bothe types of fibers are subject to ferment ability, but soluble fibers are more susceptible as compared to insoluble. Fermentation is advantageous since it favors microbial proliferation. Fast developing proliferation will consume nitrogenous products which otherwise are carcinogenic if accumulated in the colon.

Insufficient ingestion of dietary fibers cause constipation, bowel irregularities, colorectal cancer and hemorrhoids. Food with insufficient fruits, nuts, whole grains or vegetables can not provide desired quantity of fibers and may lead to deficiency. Following table number 5 is indicates the sources of fibers. The dietary fiber source noted the table number 6.

Table 5. Sources of dietary fibers.

Soluble dietary fibers	Insoluble dietary fibers
Oat-meal	Whole-wheat
Oat-bran	Wheat-bran
Nuts	Carrots
Seeds	Cucumbers
Legumes	Celery
Lentils (peas, beans)	Tomatoes
Apples	Barley
Pears	Brown-rice
Straw-berries	Bulgur
Blue-berries	Whole-grains
Blackberries	

Table 6. Dietary fiber content of selected foods.

Type	Total(g)	Soluble(g)	Insoluble(g)
Legumes per 125(g) cooked			
Kidney beans	5.8	0.5	2.9
Chick beans	5.1	2.3	2.8
Navy beans	6.2	1.3	4.9
Northern beans	5.8	2.2	3.6
Pinto-beans	5.6	1.4	4.2
Cereal grains per 125 g cooked			
Barley	7.4	1.9	5.5
Bulgar	4.2	0.9	3.3
Millets	2.9	0.5	2.4
Rice-brown	3.3	0.6	2.7
Rice white	1.7	0.1	1.6
Oat meal	0.2	-	0.2
Corn flake	2.0	1.0	1.0
Pop corn	0.5	0.0	0.5
Fruits (Medium sized)			
Banana	0.5	0.0	0.5
Apple with skin	2.0	0.5	1.5
		0.5	2.5
Pear with skin	.6	0.5	4.0
Orange with skin	3.7	0.5	1.5
Mango with skin	3.2	1.5	2.2
Peach with skin	1.0	1.3	1.9
Pineapple with skin	1.7	0.1	0.9
Plum with skin		0.9	0.8
Vegetables per 125g.			
Carrots	2.8		1.4
Cauliflower	1.3	1.4	0.8
Beets	1.5	0.5	0.8
Peas	2.5	0.7	1.6
Spinach	2.7	0.9	2.2
Tomatoes	0.9	0.5	0.9
Sweet potato	3.8	0.0	2.4
Pumpkin	3.6	0.5	3.1

5. Omega 3 Fatty Acids

5.1. Biological Source

These are found in cold-water fishes like cod, salmon, tuna, sardines, blue fish, marckevel and herring. Additionally these are also reported in cold weather bean-oil plants like flax-seed, canola, walnuts, soya bean, and freshly ground wheat germ.

5.2. Chemistry

Omega refers to the location of the first double bond along the carbon chain counting from the methyl end. Parent fatty acid of omega-3 family is Lenolenic acid. Omega-3-fatty acids are known as Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA). 15 - 30% of fats in brain in DHA. While 30-50% of fat in the eye id DHA.

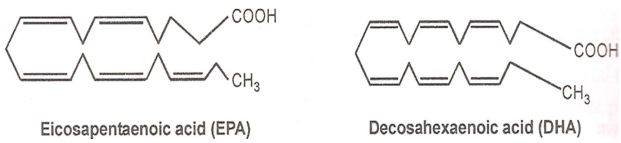

Fig. 1. Chemical nature of omega 3 fatty acids.

EPA has an extra double bond between 3rd and 4th carbon atom from methyl end of molecule. These are reported in wild animals but deficient in domestic live stock.

Omega-3 fatty acids are important components of al cell membranes. Their presence in the cell membrane increases the physicochemical stability and functional integrity of the cell. They are essential for normal growth and development at all stages of life. Omega-3 fatty acids make the cells less susceptible to oxidative damage as well as they decrease the formation of lipid peroxides.

Omega-6 fatty acids are commonly found in seeds and oils of most plant. They are abundantly available in diet and hence are not supplemented. Parent fatty acids of omega-6 family are linoleic acid.

5.3. Biological Role

It has been found that omega-3 fatty acids have significant role in atherosclerosis. The major risk factor is increased levels of low-density lipoprotein (LDL), which carries 70% of total serum cholesterol. Contrary to LDL, high-density lipoprotein (HDL) helps to clear cholesterol from arterial wall lesions, and hence reduces the risk. Atherosclerosis is characterized by injury to endothelium (tunica intima), normally by excessive free radicals. Increased permeability of this layer causes adhesion and entry of monocytes. Platelets start aggregating on the inured layer. PDGF (platelet derived growth factor) and macrophages cause proliferation of smooth muscle cells which migrate to endothelial layer. Most significantly, LDL starts accumulating within the migrated smooth muscle cells and extracellular also. Adhesion of platelets, proliferatin of smooth muscle cells and deposited cholesterol makes the artery rigid and thick structure, and causes decreased lumen.

Uses

Omega-3 fatty acids have been found to be useful due to their following activities:

1. Suppression of smooth muscle cell proliferation and migration.
2. Reduction of LDL and VLDL levels. Decrease in hypercholesterolemia and triglyceridaemia.
3. Increase in HDL levels.
4. Reduction in thromboxane formation and increased fibrinolysis.

This causes increase in blood flow property. Due to thromboxane lowering, they have anti-inflammatory action and used in arthritis.

Although they are essential fatty acids, their consumption in last 50 years has been decreased owing to changes in dietary

habits. This has led to certain non-communicable diseases, particularly mental disorders like Alzeimer's disease, since omega-3 fatty acids are selectively enriched in brain.

Preparations: Cadvion capsules [E. Merck (I) Pvt. Ltd.], Maxigard [ICICI]

6. Spirulina

6.1. Biological Source

Spirulina is a blue green algae Spirulina platensis or spirulina maxima family Oscillatoriaceae

This group of algae is considered to be one of the remarkable groups of photosynthetic simple plant forms.[5] It represents a link between green plants and bacteria. It has a soft cell wall made up of complex sugars and proteins and is different from most algae, that it is easily digested.

6.2. Habitat

It is a microscopic plant which grows in fresh water (planktonic form). Its thallus form is filamentous, unbranched and non-differentiated, and l ooks like tiny green spiral coils. It possesses ability t o thrive in conditions, which are much harsh for other algae. [5]

Spirulina is a concentrated source of food containing nutritional and contains antioxidants, probiotics and phytonutrients.

6.3. Geographical Source

Current world production of spirulina for human consumption is more than 1 thousand metric tones. It is being cultivated in United States of America and leads world production which is followed by Thailand, Mexico, India and China.

6.4. Structure of Spirulina

Cell wall is multilayered and chemically it is made up of mucopolymer and pectic compounds. Generally there is no sheath, when sheath is present; it is made up of polysaccharides. There are no chloroplast. The thylakoid lamellae are distributed randomly in the cell. [5] Chlorophyll-a is present and chlorophyll-b is absent. Other pigments are carotenoids, phycocyanin and phycoerthrin. Gas vacuoles help to regulate buoyancy. Nucleus is prokaryotic.

Spriulina is a blue green and nitrogen fixing alga. Some of current researches indicate that spirulina holds a great promise as a source of single cell protein (SCP). SCP is the protein obtained from unicellular organisms. Spirulina contains 60-65% proteins. It is cultured in clean as well as in salty water.

6.5. Chemical Composition

Spirulina contains proteins (50-70%), proteinous nitrogen (11.36%), total organic nitrogen (13.35%), nitrogen from nucleic acids (1.9%). It has net protein utilization (NPU) upto 62%.

It contains lipids (5-6%) having mostly essential fatty acids (vitamin F), composed to oleic, linoleic, gamma linoleic, palmitic, palmitoleic, heptadecanoic acids. About 40% of the fats include glycolipids including sulpholipids (2-5%) which have significant anti-HIV activity. Spirulina provides 8-14% of recommended daily allowance (RDA) of fats.

Spirulina contains the carbohydrates in the form of glycogen and rhamnose which are easily digestible and require less insulin.

Among the vitamin content, it mainly possesses natural beta carotene with 9-cis-carotenoid isomer, which has more anti-oxidant capacity. The other vitamins present are B1, B2, B3, B6, B12, and E3.

The mineral content (3-6%) mainly includes iron which is reported to be better absorbed than other natural iron, because of its soluble complexes with phycocyanin, (phycobiliprotein) which is an algal protein having the linear tetrapyrrole viz. phycocyanobilin and resembles haemoglobin. Phycocyanin, which is a blue-green pigment is believed to enhance general immunity and useful in lymphocytic activity agaist cance. Spirulina has enzyme content in the form of super oxide dismutase (SOD). This enzyme is known for its free radical scavenging effects and plays vital role in pathophysiological conditions like atherosclerosis, arthritis, cataract, diabetes and also in emotional stress and aging process. Spirulina also contains crude fibers (0.8%) and ash (6%).

6.6. Biological Role

Spirulina has been subjected t thorough screening for its biological role. Some of the findings are promising.

It has immune-stimulant activities. It stimulates the production and activity of bone marrow stem cells, macrophages and T-cells. Spleen and thymus gland shows enhanced function.

In-vitro studies on spirulina indicate that it enhances cell nucleus enzyme activity and DNA repair and hence it has possible role in cancer treatment.

Water extract of spirulina inhibits HIV-1 replication in human derived T cell lines and in human peripheral blood mononuclear cells. Calcium spirulan inhibits in-vitro replication of HIV-1, herpes simplex, Human cytomegalovirus, influenza viru, Mumps and Measle virus.

Gamma linolenic acid of spirulina helps to reduce cholesterol levels. It has appetite suppressing activity.

6.7. Uses

1. spirulina is simple and is having fast growth rate since cultivation of spirulina can be undertaken even in waste water, this helps to solve the problems of water pollution.
2. Spirulina grows well in sewage water which is best material for bio-degradations.
3. Spirulina can fix atmospheric nitrogen during its growth, can be used as a source of nitrogenous fertilizer.

6.8. Substitutes

Spirulina resembles Chlorella and Aphanizomenon flos-aquae, which are also blue-green algae. Chlorella is nutritious but lacks the antiviral and immune stimulant activities. Cell wall of Cholrella is made up of indigestible cellulose. Aphanizomenon flos-aquae contains potent nerve toxins.

7. Royal Jelly

7.1. Biological Source

It's yellowish transluscent highly viscous liquid produced by fermentation fo the secretion of the salavery gland of Worker bees namely Apidae mellifiera family Apidae along with honey and pollen grains.

7.2. Chemisty

Royal jelly is rich source of vitamins i.e. vitamin A, b1, B2, B3, B6, B12, pentothenic acid nicotinic acid, vit. C, and vit. E. it also contains various essential amino acids like histidine, methionine, leucine, lysine, phenylalanine, threonine, and tryptophan. Essential fatty acid namely 10, hydroxyl – 2 –decinoic acid is also present in royal jelly.

7.3. What is the Chemical Composition of Royal Jelly

Royal Jelly contains approximately 12% protein, 5-6% lipids and 12-15% carbohydrates. It's B Vitamin content is high, and with 17 amino acids, including all 8 essential amino acids, it is a nutritious hormone-rich substance with a wide spectrum of potential benefits. Royal Jelly also contains around 15% aspartic acid, which is important for tissue growth, muscle and cell regeneration.

7.4. Vitamin Content

Vitamin BI (Thiamine).....1.5 to 7.4mcg.

Vitamin B2 (Riboflavin).....5.3 to 10.0mcg.

Vitamin B6 (Pyridoxine).....2.2 to 10.2mcg.

Niacin (nicotinic acid).....91.0 to 149.0mcg.

Pantothenic Acid.....65.0 to 200.0mcg.

Biotin.....0.9 to 3.7mcg.

Inositol.....78.0 to 150.0mcg.

Folic Acid.....0.16 to 0.50mcg.

Vitamin C.....Trace amount only

7.5. Royal Jelly and Our Health

Royal Jelly (along with bee pollen, propolis and honey) contains a natural source of essential nutrients which the body needs to maintain good health. Maintaining good health is especially hard in today's increasingly toxic environment. Both our food supply and our diet is often deficient in important nutrients. Therefore, we need to supplement our diet with products such as royal jelly and the other products of the beehive Royal jelly also has a yeast inhibiting function which may prevent conditions such as thrush and athlete's foot. It is also used to treat muscular dystrophy, MS and Parkinson's disease as well as reduce allergic symptoms and help control cholesterol levels. Also of significance, Royal Jelly has been found to be of great help in boosting the body's resistance to the harmful side effects of chemotherapy and radiotherapy. These treatments attack the immune system at its very core, and in many cases the actual treatment delivers a debilitating blow and not the illness itself. Royal Jelly with its high amino acid content can help the immune system and provide a basic defense against external elements that ordinarily attack the immune system and reduce our body's capability for defense. Supplementing our diet with Royal Jelly helps to rebuild the good cells that are destroyed by chemotherapy and helps to strengthen the immune system. Royal Jelly also contains the amino and gamma globulin, which helps your immune system fight off viral infections. It also contains sterols, phosphorous compounds and acetylcholine, which is needed to transmit nerve messages from cell to cell. Like propolis, royal jelly also appears to have anti-tumor properties. A team of Japanese researchers gave royal jelly to one of two groups of laboratory mice before transplanting different types of cancer cells in them. The royal jelly had dramatic effects on sarcoma cells. The life-span of the mice was extended by about one-fifth and tumor sizes were about half the size, compared with untreated mice, according to a report in the journal Nippon Yakurigaku Zasshji-Folia Pharmacologica Japonica (Feb. 1987;89:73-80).

7.6. Associated Benefits

Many of the benefits of Royal Jelly are associated with its high concentration of essential amino acids, and we refer you to our chapter on amino acids for more information and more

possible benefits to explore. In short, Royal Jelly has been noted for its positive benefits on: energy chronic fatigue, skin / hair / nails / bones / joints,l hormonal regulation lasthma, sexual vitality / impotence, weight regulation, rejuvenation - recovery from illness, immune system stimulant, cholesterol levels cardiovascular health, anti-depressive / anti-anxiety, high blood pressure mental condition / memory, depression, arthritis, liver ailments / conditions eczema / impetigo / skin disorders, diabetes.

Royal jelly is used as general tonic and food supplement. Worker bees prepare it for the nutrition of Queen-bee and the larne. It is believed that the largely of more than five years of the Queen-bee OWS to Royal jelly. Now days it is mainly used in China and also in USA as an important nutraceutical.

8. Soya Beans

8.1. Biological Source

These are the fully natured dried seeds of the plant Glycene-soja and Glycine max family Leguminosae. [6]

8.2. Chemical Composition

It is rich source of carbohydrates, fats, vitamins and minerals. Soya has high contents of high quality proteins. Along with calcium it also contains iron magnesium and potassium. [6]

8.3. Biological Role

Soya contains low proportion of saturated fat, but is a rare source amongst plants containing omega-3-fatty acids (EPA & DHA). It contains no cholesterol but helps to lower blood cholesterol levels. Soya additionally contains isoflavones i.e. Genestein (Fig No:2) and daidzein (Fig No: 3). They are believed to have preventive role towards breast and prostate as well as other carcinomas. These are also known to prevent osteoporosis.

It has been accepted by FDA of United States of America that soyabean is having a role in reducing the risk of coronary heart disease. The nutrition value of soyabean curd (Tofu) has been long realized by Chinese people. [6]

Low incidence of cancers and cardio vascular diseases in Chinese and Japanese people has been linked to their traditional soya-rich diets. [6]

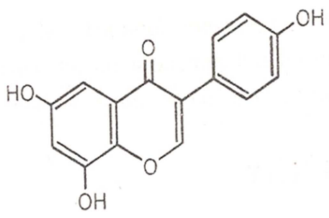

Fig. 2. Genistein.

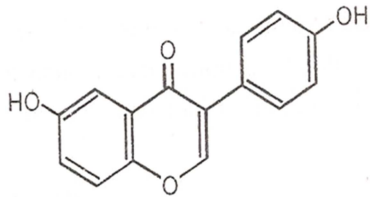

Fig. 3. Daidzein.

9. Garlic

Garlic, Allium sativum (Family Liliaceae), has been associated with humans and their food since ancient times. It is grown and used as food and medicine in all temperate climatic regions of the world. Garlic contains carbohydrates (31%), proteins (5-6%), fat (0.2%) and high amounts of phosphorus, postasium and calcium. Garlic contains a sulphur based compound called allin (present in cell vacuoles). When the cells are broken, it is converted to allicin and finally diallyl sulphide. Both of them are strong smelling and fiery tasting compounds. [7]

Garlic reduces serum lipid levels because it cause, (i) reduction or inhibition of lipogenesis and (ii) enhancing break down and excretion of lipids. It increases HDL (high density lipoproteins) and reduces LDL (low density lipoproteins). Overall, garlic is used to reduce serum cholesterol and also in treatment of atherosclerosis. Garlic has also been found to reduce platelet aggregation.

Allicin from garlic shows antibiotic activity against Mycobacterium tuberculosis, Staphylococcus aureus and S. faecalsis. Garlic is useful in treatment of amoebic dysentery and parasites like tapeworm and hook worm. Garlic exerts strong antioxidant effect, prevents lipid peroxidation and hence protects liver cells from various toxins including mutagenic chemicals**.**

10. Cosmeceuticals

“Plants are indispensible to human being for survival” has been proved since antiquity. They are the source of food, clothing and shelter.

Plants used as food, were differentiated as therapeutic agents later on by experience and as on today they are equally important even as source of drugs. [8-9]

In drug industry, herbs are used for the followings:

1) Source of phyto-pharmaceticals: to isolate pure compounds
2) Herbal raw materials: To formulate herbal, ayurvedic, homoeopathic and unani medicines.
3) Medicinal herbs: To prepare plant extracts and single

ingredient powders.

4) Dietary supplements: Sources of vitamins and enzymes.

5) As nutraceuticals: Foods containing supplements of herbal origin for prevention or to treat ailments.

6) As cosmeceuticals: cosmetic products having medicinal value.

The major part of herbs is being consumed in the cosmeceutical industry and is realized by going through their estimated demand in the US market.

At present United States annual market for cosmeceuticals has been estimated to be 2.5 US billion dollars, where as 5.0 million dollars for European countries. [9-10]

Cosmeceuticals are the cosmetic products, which contain biologically active principles or ingredients of plant origin having effect on users, or they are combination products of cosmetics and pharmaceuticals, intended to enhance the health and beauty of the skin.

They differ from cosmetics, since cosmetics are the inert substances which cleanse or enhance the appearance of the skin without any therapeutic benefit. Whereas pharmaceuticals are used to treat or prevent the diseases or are intended to affect the physiological structure or function of the body. [8] [9]

Pharmaceuticals are scrutinized and also reviewed by FDA, however one should note that cosmetics and cosmetic ingredients are tested for safety but evidence is rarely available for their beneficial claims.

Aging of the skin is cumulative phenomena and is influenced by several factors, such as

I. Temperature fluctuations

II. Exposure to the chemicals and gases.

III. Exposure to sunlight.

IV. Environmental pollution.

UV radiations from sunlight penetrate the skin and accelerate damage due to free radicals, which includes inflammation, wrinkling and hyper pigmentation.

Due to prolonged exposure to UV radiation the collagen and elastin fibers of the skin are broken down by the enzymes collagenase and elastase and texture of the skin deteriorates. Collagen extracts and antioxidants obtained from natural sources are able to prevent the aging and also improving the appearance of the skin. [9-10]

Several herbal drugs (Ayurvedic drugs) are used in medical practice, in the formulation of cosmeceuticals since long. They are used in dental products, various disorders of skin and hair. Few of them are as under table number 7.

Table 7. Skin disorders and herbal drug used.

Skin disorders		
Sr.No.	**Desiredaction**	**Names of herbal drugs used**
1.	Anti-acne	Arjune, Cucumbergel, Manjishta, Vetive.
2.	Anti-inflammatory	Aloe-vera, Boswellia, Chandan, Raktachandan, gRose.
3.	Anti-oxidant	Amla, Ginkgo-bilobe, Rosemary, Turmeric, Greentea.
		Apricot, Aloe-vera, Ashwagandha, Ginsing, Liquorice, Papaya.
4.	Anti-wrinkle	Amla, Aloe-vera, Curcuma.
5.	Anti-aging	Chammomile, Galls, Lemon, Puslay, Sage, Thyme.
6.	Astringent	Papaya, Cucumber, Turmeric, Manjistha.
		Almondoil, Aloe-vera, Fenugreek, Neem, Rose, Vetiver.
7.	Depigmentation	Marigold, Raktachandan, Aloe, Turmeric
8.	Moisturizing	Cabbage, Citruspeels, Amla, Rose, Cucumbr, Geranium, Sandalwood, Papaya, Aloes.
9.	Bleaching	Neem, Tulsi, Citruspeels, Turmeric, Lavenderoil, Witchhazel
10.	Cleansing	Vetivr, Lemon, Neem, Rose, Fenugreek, Mentha, Cucumber
11.	Antiseptic	Calundulla, Carrat, Chammomile, Cucumber, Aloe-vera, Red-sanders.
12.	Coolingeffect	Ashwagandha, Fenugreek, Almondoil, Sesameoil, Vetiver, Aloe-veragel, Orangeoil.
13.	SunScreen	
14.	Smoothening of skin	Wheat-germoil, Honey, Peach, Carrot, Apricot
15.	Nourishing to skin	
Hair-Disorders		
Sr.No.	**Desired action**	**Names of herbal drugs used**
1.	Anti-dandruff	Soapnut, Shikekai, Arnice, Thyme, Rosemary, Aloe-vera, parsley, KapurKachari. Kachur-sugandhi, Sitaphal
2.	Anti-lice	Jatamansi, Cocountoil, Sesameoil, Brahmi, Amla, Hibiscus.
3.	Hair-tonic	Amla, Soap-nut, Shikekai, Marigold.
4.	Hair-wash	Eclipat, Amla, Henna, Hibiscus, Sage, Bloodroot, Chammomile.
5.	Hairdye	Eclipata, Rosemary, Fenugreek, Henna, Amla, Hibiscus.
6.	Hair-conditioner	Soap-nut, Shikekai, Sage, Hennacoconutoil.

10.1. Retinoic acid (Tritinoin)

Naturally occurring form of vitamin A is known as retinoic acid which is very commonly used topically for the treatment of photo-aged skin (sun-damaged skin) and also for acne i.e. skin eruption with red pimples. Retinoic acid is said to increase the rate of cell-division and turnover. It is also useful in reducing the wrinkles, hyper pigmentation, and roughness due to over exposure to sunlight. [11-12]

10.2. Alpha-Hydroxy Acids

Glycolic acid and lactic acid are the commonly used alpha hydroxyl acids in cosmeceutical formulations. These weaken the linkage of cells in dry skin and favor its exfoliation (shedding). The flexibility of skinn is increased due to topical applications. Aleuritc acid from shellac is now-a-days preferred as a substitute for α-hydroxy acids. [10]

10.3. Boswellic Acids

These are present in the resin of Boswelllia serrata and are said to inhibit the enzymes responsible for inflammation (5-lipoxygenase) and damage (due to elastin) of the skin hence incorporated in anti-inflammatory creams and lotions usually. [11, 12]

10.4. Vitamins (Vit. C and Vit. E)

A well known antioxidant vitamin C from amla tremendously used in the form of Ayurvedic formulation internally as well as externally. It is described to be the scavenger of oxygen free formation of free radicals causing the skin to age rapidly. Vit. C has synergistic effect with Vit. E and is used as protective against UV radiation.

10.5. Co-enzyme Q10 (Ubiquinone)

UV radiations not only damage the skin but also have reported to reduce its natural ubiquinone content. Experimentally also in the cultured human cells, the results with ubiquinone were found to coinsider; additionally ubiquinone reduces the activity of enzymes which degrade the collagen.

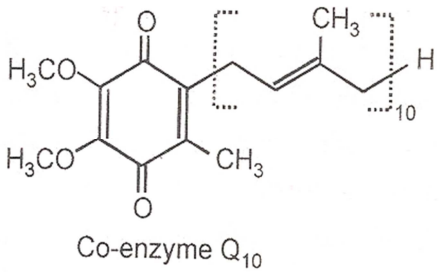

Fig. 4. Coenzymes.

Mol. Formula (C59H90O4) Mol.Wt(863.36)

10.6. Miscellaneous

UV radiations not only damage the skin but also have reported to reduce its natural ubiquinone content. Experimentally also in the cultured human cells, the results with ubiquinone were found to coinsider; additionally ubiquinone reduces the activity of enzymes which degrade the collagen.

11. Conclusion

Nutrition are obtained from plant soruce i.e Ascorbic acid, Quercetin, Capsaicinoids Lycopene, β-Carotene and Catechins. Conjugated lenoleic acid (CLA), EPA, DHA, Choline Lecithene, Ubiqunnone, and Spingolipids obtained from Animals and Yeast, [13, 14] Lactobacllus acidophilus, Streptococcus salvaricus are from microbial resources. Nutritionindicating their therapeutic activities like some Anti oxidant (β carotene, Polyphenolics, Tocopherols Lycopene, Ellagic acid), Anti inflammatory (Curcumin, Quercetin, Capsaicin), [14, 15] Anti cancer (Genestein, Limonene, Glycyrrhizin) and Antibacterial activity. Nutrition according to their higher contents in specific foods items like Lycopene (Tomato), Curcumin (Turmeric) and Quercetin (citrus fruits). Cosmetics are the inert substances which cleanse or enhance the appearance of the skin without any therapeutic benefit. [15, 16] Whereas pharmaceuticals are used to treat or prevent the diseases or are intended to affect the physiological structure or function of the body. Here find out the knowledge about the nutritive value of various food items and their basic chemical roles has much increased. The major diseases for the prevention and or treatment of which, nutrition have been associated are heart disease, cancer, hypertension and diabetes. The other diseases, related with role of nutraceuticals are osteoporosis, arthritis and neural tube defects. Certain dietary habits can enhance cancer risk. The food substances used as nutrition contain anti-oxidants, prebiotics, probiotics, omega-3 fatty acids, [16] certain phyto chemicals and dietary fibres. Except probiotics, all these components are present in fruits, vegetables and different types of foods. [17, 18] Cosmetic products contain biologically active principles to ingredients of plant origin having effect on users, or they are combination products of combination products of cosmetics and pharmaceuticals, intended to enhance the health and beauty of the skin. [19, 20] They differ from cosmetics, since cosmetics are the inert substances which cleanse or enhance the appearance of the skin without any therapeutic benefit. [20] Where as pharmaceuticals are used to treat or prevent the diseases or intended to affect the physiological structure or function of the body.

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