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Natural Antioxidants and their Intrinsic Worth for Wellbeing

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Abstract

Free radicals produced on exposure to sunlight, Xrays, ozone, tobacco smoke, automobile exhaust, environmental pollutants, and by several other physiological processes, are highly reactive and can damage nucleic acids, proteins, lipids and carbohydrates that subsequently affect the immune functioning causing degenerative diseases. In a normal cell there is an appropriate balance between prooxidant and antioxidants. When the level of pro-oxidants is increased in comparison to antioxidant, this state is termed as oxidative stress (OS). It is imposed on the cells due to increase in oxidant generation and decrease in antioxidants protection, resulting in failure in repair of oxidative damage. Exposure to pathogens, inappropriate lifestyle, excessive exercise, and by-products of normal metabolism are also contributing factors to OS. Reactive oxygen species are also responsible for DNA (deoxyribose nucleic acid) damages resulting in mutagenic changes that are responsible for several diseases. Oxidative stress deregulates the cellular functions leading to neuro-degenerative diseases, gastroduodenal pathogenesis, some kinds of cancer, cataracts, premature aging, inflammation, cardiovascular, and metabolic dysfunction. It may also influence the immune system either by hyper-excision to cause autoimmune disorder, or suppress it, resulting in the high susceptibility to infection. Owing to increased safety concerns about synthetic antioxidants, exploitation of safer antioxidants based on natural origin is the focus of research nowadays, and the present study has hallmarked the same. In this manuscript, therapeutic worth of various constituents including antioxidants of natural products viz. garlic, soyabean, gooseberry, broccoli, spirulina and aloevera have been delineated precisely.

Index terms— phytochemicals; allicin; genestein; glucomannans; RDA; pdcaasw; peroxidation; ROS: free radicals; nutritive value; epidemiological data.

1 Introduction

ntioxidants are vitamins or nutrients that may help to prevent the damaging effects of oxidation on your body's organs and tissues [1].

They achieve this by protecting the cells of human body from the damage done by "free radicals". Protection of body cells is the main feature and root cause for all benefits of antioxidants. What are free before any symptoms will appear. There are many factors in our environment which contribute to an increase of free radicals in our bodies [5,[49][50][51][52][53][54][55].

External damaging free radicals are derived from the elements we live with, such as chlorine in the water we drink, chemicals in the food we eat, smoking, polluted air we breathe and radiation from the sun or other sources like power lines, electromagnetic waves etc. Free radicals can steal an electron and break down another biomolecule such as loose proteins, sugars, fatty acids, etc. that are not part of a larger chemical structure. In these cases the free radical does little damage. If a free radical steals an electron from one of the proteins that is contained in a strand of collagen (rather than a loose protein), it causes a change in the chemical structure of

the collagen at that point and causes a break in the collagen strand. This is damage. Once a bundle of collagen has multiple points of damage which occurs over years, the strand of collagen becomes dysfunctional and loses its elastic quality6. The skin begins to sag. Over time free radical damage happens to the various components of the body and this damage is progressive. Free radicals chip away at cell walls, molecule by molecule, making holes. The cells leak and lose their chemical balances. Subsequent free radicals are able to chip away at DNA, making cells dysfunctional. If this damage affects cellular DNA, the cell may malfunction and this is what happens cell by cell over the lifetime of a human being, ultimately causing entire organs to malfunction, because their cells malfunction. If the DNA of basal keratinocytes, for example, are damaged the cells may become dysfunctional and the basal cells will reproduce cells that are equally as damaged and dysfunctional, resulting in the aging and dysfunction of the skin and its various components. Aging is simply the progression of damage, caused by free radicals [7][8][9][56][57][58][59][60][61].

The major creators of free radicals in the skin are **??**1. normal chemical processes such as producing and using energy, producing skin components such as lipids, and other daily chemical processes that give off free radicals as a natural byproduct (2. unprotected sun exposure, (3. products applied to the skin that produce free radicals and (4. pollution. When acne is involved, acne becomes another creator of free radicals and in the case of moderate to severe acne, assumes the second position, ahead of unprotected sun exposure. Most of the chemical processes that occur in the skin, emit free radicals. In the body, the processing of food, producing energy and using energy creates free radicals. Breathing and using our muscles to perform functions creates free radicals. Manufacturing collagen or lipids or pigment produces free radicals. These free radicals can create damage to the components of the skin as they steal an electron from another component to make themselves complete and stable. When acne infections occur, the skin generates hydrogen peroxide to kill bacteria. Hydrogen peroxide gives peroxide free radical and damages the components of the skin. The infections destroy skin components and all of these components must be repaired or reproduced. This again generates volumes of chemical processes that generate additional volumes of damaging free radicals [10,[62][63][64][65] **??**66][67][68].

One way to protect cells from free radicals is to provide our bodies with molecules which can be used as targets for oxidation -diverting their "attention" from the molecules that make cells and membranes! These special molecules are antioxidants: they are able easily to lose, or to accept electrons, with no harm done.

So, the major feature of antioxidants is that they neutralize free radicals, thus preventing potential damage. All the benefits of antioxidants are the result of this feature. Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Although there are several enzyme systems within the body that scavenge free radicals, the principle micronutrient (vitamin) antioxidants are vitamin E, beta-carotene, and vitamin C. Additionally, selenium, a trace metal that is required for proper function of one of the body's antioxidant enzyme systems, is sometimes included in this category. The body cannot manufacture these micronutrients so they must be supplied in the diet [11][12]. Antioxidants destroy free radicals"...

In recent years, a new term 'neutraceuticals' has been coined, which combines 'nutrition' and 'pharmaceutical' to mean that they have healthenhancing role or physiologically active food components that can have certain prophylactic and / or healing properties and can be used as preventive drugs or as food supplements, Stephen de Felice, Director of NYFIM (New York's Foundation for Innovation in Medicine) is credited with the first use of the term neutraceutical. These compounds include disease preventing phytochemicals or phytonutrients present in food stuffs; for example, isoflavones in soyabean, lycopene in tomatoes, lignans in flaxseed, and sulphoraphane in broccoli, which have protective effect against cancer [14][15][16]. In future, phytochemicals of neutraceutical importance may be used as preventive medicine. Growing evidence indicates that antioxidants can scavenge free radicals and offer protection against a variety of diseases. Antioxidants are known to diffuse the volatile toxic molecules of ROS and protect lung tissue from their toxic effects. Phytochemicals such as carotenoids, limonoids, tocopherols, ascorbates, lipoic acid, and polyphenols are strong natural antioxidants generally found in plants and foods that play an important role in human health [17,20,63].

Carotenoids: Terpenes are the largest class of phytochemicals, with carotenoids and limonoids being its two major subclasses. There are more than 700 naturally occurring carotenoids that acts as biological antioxidants and protect cells and tissues from the damaging effects of free radicals. Carrots, tomatoes, parsley, papaya, orange and green leafy vegetables like amaranth, chenopods, mustard, fenugreek, spinach, cabbage, radish and turnip are rich sources of carotenoids. They have been classified into two major groups on the basis of their structure (i) carotenes (?carotene, lycopene) containing only carbon and hydrogen that may be cyclic or linear; and (ii) oxycarotenoids (xanthophylls, lutein) containing carbon, hydrogen and oxygen in the form of hydroxyl, epoxy or oxy groups. In carotenoids, the polyene chain with conjugated double bonds is responsible for their characteristic absorption spectra and specific photochemical properties. Among the carotenes, natural ?-carotene is the precursor of vitamin A and has preventive action against eye diseases and cancer. Carotenes enhance immune response and protect skin cells against UV radiations. They help to lower the risk of cardiovascular diseases, age related vision disorders, asthma and reduce inflammation. Lycopene in red coloured tomatoes is effective against oxidative stress 21,22 . Along with carotene and lutein, it provides protection against lung, breast, uterus and prostate cancers. Green leafy vegetables and corn are best sources of xanthophylls and protect retinal part of human eye. Astaxanthin, a xanthophylls found in sea foods, and limonoids present in citrus fruits

are biologically active phytochemicals which protect lung tissue from free oxygen radicals and inhibit proliferation of human breast cancer [6].

Tocopherols and Tocotrienols: They are nonpolar constituents of biological membranes that exist in nature of lipid phase. Vitamin E is found in unrefined cereal grain, vegetable oils, wheat germ, nuts, fruits and green leafy vegetables and have beneficial effects in heart, cancer, cataract, and Alzheimer's disease. ?tocopherol is the most abundant forms of tocopherols. ?-tocopherols can reduce most effectively the concentration of nitrogen dioxide that is involved in carcinogenesis, arthritis, and neurologic diseases. The unique structure of ?-tocopherol enables it to act as an effective antioxidant and to be regenerated through reaction with other oxidants. Tocopherols, mainly found in palm oil, cereal grains and kale are potential antioxidants and are associated with the reduced risk of cancer, Alzheimer's and cardiovascular diseases. They also have cholesterol lowering ability and inhibit LDL (Low Density Lipoprotein) oxidation. ?-tocopherol is preferentially absorbed compared to its other forms. Even though tocotrienols have a higher radical scavenging activity than tocopherols, they are less bioavailable as compared to the latter. Ascorbic acid (Vitamin C): Rose hips, chillies, guava, citrus fruits, berries, kiwi fruit and some vegetables are main sources of vitamin C with beneficial effects in cardiovascular health, cancer, immunity and connective tissues. It is leading natural antioxidant that can scavenge ROS and has anticarcinogenic effect. It is excellent electron donor, which makes generation of relatively stable semidehydroascorbic acid as well as its easy conversion from dehydroascorbic acid to ascorbic acid possible. Synthetic antioxidants such as BHT and BHA were found less effective than ascorbic acid. Oxidation of ascorbic acid is highly influenced by heat, light, water, pH, oxygen concentration and metal ions like Cu+2 and Fe+3. It may be related to the prevention of some forms of cancer and heart diseases. Ascorbic acid and tocopherol supplementation can substantially reduce oxidative damage. Their effects are greater in non-smokers than smokers. Smoking induces oxidative stress from numerous free radical compounds in the gaseous phase and the radicals formed from ascorbic acid acts as pro-oxidant in smokers.

Lipoic acid: Some sulphur containing compounds like GSH [glutathione], lipoic acid and dihydro liopic acid present in spinach, broccoli and yeast show antioxidant activities. They prevent oxidative damage of proteins, regenerate GSH in the liver, kidney and lung tissues, protect brain and nerve tissues, and reduce diabetes related complications and thus play an important role in reduction of blood glucose concentration. Lipoic acid improves mitochondrial membrane potential. Age related memory loss and brain ailments, including Alzheimer's and Parkinson's disease. It also has the ability for radical scavenging and metal chelation.

Polyphenols: The term polyphenol or phenolics refer precisely to those chemical compounds which have an aromatic ring with hydroxyl substituent (s)., including their derivatives. On the basis of chemical structure, they can be classified into phenolic acids, flavonoids, stibenes and lignans. Berries, ginkago, onions, apples grapes, chamomile, dandelion, green tea [48], hawthorn, licorice, rosemary, thyme, and some beverages (like red wine, coffee, cocoa, beer) are natural sources of polyphenols with strong antioxidant activity and biological properties. They can enhance the activity of vitamin C. they act against allergies, ulcers, tumours, platelet aggregation, are and are also effective in controlling hyper tension. Flavonoids possess ideal structure for free radical scavenging activity and have been found to be more effective antioxidant in vitro than tocopherols and ascorbates. More than 4,000 flavonoids have been identified in plants, which are responsible for the colour of vegetables, fruits, grains, seeds, leaves, flowers, bark and product derived from them. They are powerful antioxidant that inhibit the oxidation of low density lipoprotein (LDL), a major factor in the promotion of atherosclerosis, which is the plaque build-up in arteries that can lead to heart attack or stroke. Isoflavones like genestein [13] and daidzein found abundantly in legumes such as lentils, chickpeas and soyabeans, have neutraceutical properties against tumour growth and cancer and they form one of the main classes of oestrogenic substances in plants.

Polyphenols are powerful scavengers of free radicals and also act as anti-inflammatory, anti-ulcer, antitumour and anticancer agents. They act as potent chain-breaking antioxidants and possess vitamin C stabilising activity by increasing its adsorption. Their therapeutic usefulness has been demonstrated in gastrointestinal haemorrhages, radiation reactions, erythroblastosis, menorrhagia, bleeding cystilis, tuberculosis, haemophysis, periodontal diseases, epitasis, and ophthalmic disorders. Polyphenols bind with transition metals, particularly iron and copper, and thus inhibit transition metal-catalysed free-radical formation. The chelated transition metals become unavailable to interact with other compounds and initiate biologically damaging reactions. Polyphenols inhibit lipid peroxidation, oxidation of linoleic acid and Fe+2 catalysed oxidation of glutamine synthase, through free radical scavenging and removal of metals ions from catalytic sites via chelation. They are also known to modify the activities of some enzymes involved in immune functions, carcinogenesis, cellular transformations, tumour growth and metastasis. Biological effects of phenols are of great interest since evidence has been found that they offer protection against several diseases. They have the potential to inhibit oxidation of LDL that is considered to be a key mechanism in atherosclerosis. Certain studies have shown that the consumption of foods rich in polyphenols results in reduced susceptibility of LDL to oxidation and are also effective scavengers of free radicals, responsible for DNA damage and tumour promotion. They were found to have beneficial effect in rheumatoid arthritis and experimental studies showed their anti-inflammatory activity.

Epidemiological studies provide convincing evidence that a diet rich in antioxidant is associated with a lower incidence of degenerative diseases. Cereals, legumes (barley, corn, nuts, oats, rice, sorghum, wheat, beans, and pulses), oilseeds (rapeseed, canola, flax seed and olive seeds), fruits, vegetables and beverages (fruit juices, tea, coffee, cocoa, beer and wine) are the main sources of dietary polyphenols. Fruits like apple, grape, pear, cherry

and various berries contain up to 200-300mg polyphenols per 100 g fresh weight. A glass of red wine or a cup of coffee or tea contains about 100mg polyphenols. Their total dietary intake may be about 1g per day, which is about 10x higher than of vitamin C and 100 times higher than those of vitamin E and carotenoids. The major constituents of tea polyphenols of tea polyphenols constitute up to 30 per cent of the dry weight of green leaves and 9-10% of dry weight of black tea leaves. Citrus fruits are main sources of flavomones, and hesperidin is found in abundance (120-250mg/l) in orange juice. Fruits, particulary onions are rich source of quercetin. Anthocyanins are pigments of fruits such as cherries, plums, strawberries and red currant, ranging from 0.15 to 4.5 mg/g in fresh berries. Soyabean is main source of isoflavonoids like genistein and daidzein that have important role in prevention of cancer and osteoporosis. People who consume traditional diets rich in soy and tea rarely have breast, uterus and prostate cancer [55].

Bitter ways to slow aging: Cumin or jeera, extensively used in Indian cuisine, is known to possess antiparasitic and antimicrobial properties. It is also used to cure fewer and as a painkiller. One of the variants of cumin, bitter cumin (kalijiri), has been studied for its antianagsic and astringent properties. It is dried seed of the herb Centatherum anthelminticum and used to treat a wide range of diseases from vitiligo to hyperglycemia. Now, a research suggests that bitter cumin contains high levels of antioxidants. ROSs, also known as free radicals, are produced as part of the metabolic processes necessary for life. These are required or various functions like cell growth and energy production. But conversely their increased concentrations and nonremoval from of the body can lead to abnormalities like neurodegerative disorders and cancer. Anti oxidants detoxify these free radicals and help in their removal from the body. By neutralising these ROS, antioxidants also slow down the aging process. Common antioxidantsinclude vitamin C and E.

Researchers at the CFTRI (Central Food Technological Research Institute), Mysore, conducted an experiment on bitter cumin treated with a combination of CH3COCH3 (actone), CH3OH (methanol) and H2O (water). the antioxidant activity of bitter cumin extracts were then characterised using various free radical scavenging tools like DPPH (2,2diphenyl-1-picrylhydrazyl) and ABTS (2,2'-azino-bis-3ethyl benzthiazoline-6-sulphonic acid). To validate the results, extracts were also tested for their reducing power -ability to donate electrons. Higher the reducing power of the sample better is the antioxidant activity. The results revealed that bitter cumin extracts were strong antioxidants with different magnitude of potency in scavenging different ROS at the µg concentration. The phenol extract of bitter cumin contains an array of phenolic compounds which may be responsible for its antioxidant activity. The extracts were also strong electron donors and hence potential reducing agents. Another marker of antioxidation, he adds. Bitter cumin extracts were also able to minimize oxidative damage to DNA, one of the most detrimental effects of free radicals. They also found that radical scavenging activity of bitter cumin phenols is the highest among all plant phenols. Previous studies have reported number, type and concentrations of phenols in plants exhibit extreme diversity. IT has been observed on broad spectrum analysis, reported phenolic compounds, antioxidant, anto-hyperglycemic, antimicrobial activity of bitter cumin. It is a native to the Upper Egypt but now grown in countries across the world especially India, North Africa, China and the US.

2 II.

3 Therapeutic Significance of Soyabean

Soybean 40% protein and 20% oil and thus, assumes a predominant position in solving the problem of food shortage the world over. A native of China, soybean has been cultivated for food well over 13,000 years. The Chinese name for soybean means 'greater bean'. Like other beans, soybeans grow in pods, containing edible seeds (Figure 1). While we most often think of them as being green, the seeds can also be yellow, brown or black. Today soybeans are grown all over the world. This plant was introduced in most countries as a source of oil food and protein for livestock but now it is commercially grown for many food and industrial purposes. About 70% of the total production goes for oil extraction and rest for seed purposes (10%) and direct food uses (20%). The oil so obtained is refined and used for culinary purposes. It is also used as an important ingredient for industrial products such as paints, plastics, lubricants and bio-fuels. The main by-product of the oil industry, namely lecithin (phospholipid) finds commercial application as a nutritional supplement and emulsifier. Other by-product includes hulls, which are used in animal feeds and as a source of fiber [23]. The meal primarily used as a source of protein for poultry, piggery, livestock, aquaculture, etc. Soy meal has more than 50% edible grade protein, which can also be diverted for food uses. However the meal from the solvent extraction plants must be made edible grade and devoid of the residual solvents, which may cause various physiological disorders in humans. The ISO (International Standard Organisation) recommends 50ppm of residual hexane while BIS (Bureau of Indian Standards) allows 170ppm of such residual solvents. In an innovative process, developed by the INTSOY (International Soybean Center) at the University of Illinois, the soya bean oil is extracted primarily through extrusion. The meal is devoid of the solvent and also contains low profile of fat. It may be used for direct food uses through either supplementation of fortification with traditional foods.

4 III.

5 Major Constituents of Soy

Soy foods contain all nine essential amino acids. The PDCAASW (protein digestibility corrected amino acid score) is 1.0, which is equivalent to animal protein. Soybeans have a number of nutritional advantages over other food legumes. Soybean derives about 35 to 38% of its calories from protein compared to ~20 to 30% in other legumes. It contains on an average 40% protein that is much higher when compared to other legumes. The values for other legumes are: chickpea, 4.9-29.6%; peas, 21.2-32.9%; cowpea, 20.9-38.5; pigeon pea, 18.8-28.5%; green gram, 20.8-33.1%; lentil, 20.4-30.5% and lathyrus, 22.7-29.6%. The quality of soya proteins is almost at par with egg or milk proteins, which are ideal with reference to their essential amino acid make-up24. Like other pulses, soybeans are deficient in sulphur-containing amino acids such as cystine and methionine. Since it has more lysine than cereals, its blending with them makes the product well balanced. It is therefore suggested to blend soybean with cereals, millets and other pulses at different proportions as per our body requirement. Substitution of soy protein for a protein source of animal origin can result in reduction of calorie. Soy protein concentrate and soy protein isolate are reported to have 330 cal/100g. The soy-based diet thus lowers the incidences of obesity. Active isoflavone compounds found in soy, specifically, genistein [24] help us stay lean by producing fewer and smaller fat cells.

Approximately 40% of the calories in soybeans are derived from fats. Soybean has exceptionally large quantities of fat. It has on an average 20% oil. The oil is hypocholesterolemic. The oil content is much higher than other pulses such as black gram, 1.64%; pigeon pea, 2.19%; cowpea, 2.05%; chick pea, 4.99%; lentil, 1.17%; lathyrus, 1.0% and green gram, 2.14%. The quality of oil is normally judged by its fatty acid composition. More the unsaturated fatty acids better the quality of oil. It contains about 78% of unsaturated fatty acids. Out of them linoleic and linolenic constitute 58%. They are called PUFS (polyunsaturated fatty acids). The IV (iodine value) is in the range of 125-135. The oil remains liquid over a relatively wide range. The oil can be hydrogenated selectively for blending with semi solid or liquid oils. Naturally occurring antioxidants/ tocopherols are present and are not completely removed during processing. However, soya oil has certain disadvantage like high phosphate content (2%), which must be removed by processing. The oil also contains 7-8% linolenic acid, which is responsible for flavour and odor reversion **??**25. It contains about 20 **??**27.9mg)/ 100g of beans. All whole, unprocessed plant foods contain dietary fiber. One serving of soybeans provides approximately 8 grams of dietary fiber. However, many soya foods are processed in ways that decrease their fiber content significantly. Tofu and soya milk, two of the more popular soya foods, contain very little fiber. Soya foods that utilize the whole bean such as tempeh, soya flour and textured soya protein, are high in fiber. About 30% of the fiber in soya foods is soluble fiber [26].

It is a rich source of vitamin A (426mg); thiamine (73mg); riboflavin (39mg) and niacin (3.2mg)/ 100g beans. Soya foods are the richest source of isoflavones. These are phyto-serms (selective estrogen receptor modulators). They have some estrogen-like qualities and have non-hormonal properties as well. The two primary isoflavones in soybeans are genistein and diadzein and their glycosides. They contribute to many protective effects. Soy foods and other soy based dairy analogues can serve as a balanced and remedial substitute of dairy milk for lactose intolerant persons. This condition arises mainly due to lack of beta galactosidase, the enzyme responsible for the hydrolysis of lactose in the intestine. The lactose is in turn degraded by the colonic bacteria into acid and carbon dioxide causing gastric discomfort such as flatulence, bloating, belching and diarrhoea. Since soybean has no lactose in it, the products prepared from soybean, namely, soy paneer and other soymilk analogues can serve as an ideal substitute of regular milk. There is some evidence that soya foods may help with sugar control in diabetics. Soy may also help lower risk of some of the complications of diabetes, such as kidney disease. Soybeans have a very low GI (glycemic index) and are valuable in a diabetic diet. Blood sugar control may also be improved by choosing carbohydrates that are high in soluble fiber. It helps in the slow absorption of the sugars. In kidney disease, a soy-based diet may be preferable to the traditional low protein diet from decreasing the renal damage. Soy provides high quality protein without stimulating hyper filtration and proteinuria. It prevents kidney damage by lowering serum LDL cholesterol levels [27].

Soybeans have a nutrient profile for heart health and have other properties that may help lower risk for heart disease. Soy protein lowers the total and LDL cholesterol levels. Soy foods are excellent choice for a heart-healthy diet. Soy oil provides the plant-derived omega-3 fatty acid, ALA, while fish oil contains the marine-derived omega-3 fatty acids, EPA and DHA. These omega-3 fatty acids improve heart function by providing greater variability between beats, therefore reducing the risk of arrhythmia and/ or sudden death. Soy in the diets will have significant reduction in both diastolic and systolic blood pressure. Not only the total blood cholesterol is significantly lowered, the level of HDL(High Density Lipoproten) good cholesterol are also significantly increased. Soy protein can reduce high blood cholesterol levels by 10 to 15% -enough to cut the chances of a heart attack by upto 30%. Soy protein inhibits cholesterol oxidation. Oxidised cholesterol is cholesterol that has undergone structural changes because of exposure to oxygen, damage arteries.

The hormonal changes that occur during menopause can cause a variety of symptoms and increase risk for heart disease and osteoporosis. During perimanopause women experience fluctuations in estrogen levels. This can cause hot flashes, night sweats, insomnia, vaginal dryness or headaches. HRT (Hormonal Replacement Therapy) is commonly prescribed to help prevent the negative health effects of menopause. However, many women do not want to take HRT because of the possible increased risk for breast cancer. Soya foods, which contain isoflavones,

may decrease the health risk associated with menopause. They also lower the rates of osteoporosis and heart disease leading to longer expectancy. Soya foods contain anticarcinogens that may prove protective. They lower the incidences of breast, prostate and colon cancers. Soy foods fit in the formulation of a health promoting diet. The fiber in soyabeans also provides preventive therapy for several other conditions. High-Fiber soybeans may be able to help reduce the risk of colon cancer. As a matter of fact, in areas of the world where soybeans are eaten regularly, rates of colon cancer, as well as some other cancers, including breast cancer, tend to be low. Soybean fiber may also be able to reduce the symptoms of diarrhoea or constipation in suffers o irritable bowel syndrome [28].

IV.

6 Therapeutic Significance of Aloe Vera

Aloe vera (Figure 2) contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids. It contains vitamins A (?-carotene), C and E, which are antioxidants. It also contains vitamin B12, folic acid, and choline. It provides 20 of the 22 human required amino acids and 7 of the 8 essential amino acids. It also contains salicylic acid that possesses anti-inflammatory and antibacterial properties. Lignin, an inert substance, when included in topical preparations, enhances penetrative effect of the other ingredients into the skin. Saponins that are the soapy substances form about 3% of the gel and have cleansing and antiseptic properties. Glucomannan, a mannose-rich polysaccharide, and gibberellin, a growth hormone, interacts with growth factor receptors on the fibroblast, thereby stimulating its activity and proliferation, which in turn significantly increases collagen synthesis after topical and oral Aloe vera [9]. Aloe gel not only increased collagen content of the wound but also changed collagen composition (more type III) and increased the degree of collagen cross linking. Due to this, it accelerated wound contraction and increased the breaking strength of resulting scar tissue. An increased synthesis of hyaluronic acid and dermatan sulphate in the granulation tissue of a healing wound following oral or topical treatment has been reported.

Aloe vera gel has been reported to have a protective effect against radiation damage to the skin. Exact role is not known, but following the administration of aloe vera gel, an antioxidant protein, metallothionein, is generated in the skin, which scavenges hydroxyl radicals and prevents suppression of superoxide dismutase and glutathione peroxidase in the skin. It reduces the production and release of skin keratinocytederived immunosuppressive cytokines such as interleukin-10 (IL-10) and hence prevents UV-induced suppression of delayed type hypersensitivity. Aloe vera inhibits the cyclooxygenase pathway and reduces prostaglandin E2 production from arachidonic acid. Recently, the novel anti-inflammatory compound called C-glucosyl chromone was isolated from gel extracts. Alprogen inhibit calcium influx into mast cells, thereby inhibiting the antigen-antibody-mediated release of histamine and leukotriene from mast cells.7In a study on mice that had previously been implanted with murine sarcoma cells, acemannan stimulates the synthesis and release of interleukin-1 (IL-1) and tumor necrosis factor from macrophages in mice, which in turn initiated an immune attack that resulted in necrosis and regression of the cancerous cells. Several low-molecular-weight compounds are also capable of inhibiting the release of reactive oxygen free radicals from activated human neutrophils. Anthraquinones present in latex are a potent laxative. It increases intestinal water content, stimulates mucus secretion and increases intestinal peristalsis.

Antiviral and antitumor actions may be due to indirect or direct effects. Indirect effect is due to stimulation of the immune system and direct effect is due to anthraquinones. The anthraquinone alone inactivates various enveloped viruses such as herpes simplex, varicella zoster and influenza. In recent studies, a polysaccharide fraction has shown to inhibit the binding of benzopyrene to primary rat hepatocytes, thereby preventing the formation of potentially cancerinitiating benzopyrene-DNA adducts. An induction of glutathione S-transferase and an inhibition of the tumorpromoting effects of phorbol myristic acetate has also been reported which suggest a possible benefit of using aloe gel in cancer chemoprevention. Mucopolysaccharides help in binding moisture into the skin. Aloe stimulates fibroblast which produces the collagen and elastin fibers making the skin more elastic and less wrinkled. It also has cohesive effects on the superficial flaking epidermal cells by sticking them together, which softens the skin. The amino acids also soften hardened skin cells and zinc acts as an astringent to tighten pores. Its moisturizing effects has also been studied in treatment of dry skin associated with occupational exposure where aloevera gel gloves improved the skin integrity, decreases appearance of fine wrinkle and decreases erythema. It also has antiacne effect. Aloe vera contains 6 antiseptic agents: Lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and S (sulphur). They all have inhibitory action on fungi, bacteria and viruses V.

7 Therapeutic Significance of Spirulina

Spirulina is a blue-green algae (cyanobacterium). It is a simple, one-celled form of algae that thrives in warm, alkaline fresh-water bodies. The name ”spirulina” is derived from the Latin word for ”helix” or ”spiral”; denoting the physical configuration of the organism when it forms swirling, microscopic strands. Spirulina (Figure 3) is being developed as the ”food of the future” because of its amazing ability to synthesize high-quality concentrated food more efficiently than any other algae. Most notably, Spirulina is 65 to 71 % complete protein, with all essential amino acids in perfect balance. In comparison, beef is only 22 % protein. Spirulina has a photosynthetic conversion rate of 8 to 10 %, compared to only 3 % in such landgrowing plants as soybeans. In addition, Spirulina

is one of the few plant sources of vitamin B12, usually found only in animal tissues. A teaspoon of Spirulina supplies 212x the RDA (Recommended Daily Allowance) of vitamin B12 and contains over twice the amount of this vitamin found in an equivalent serving of live [29]. Spirulina also provides high concentrations of many other nutrients -amino acids, chelated minerals, pigmentations, rhamnose sugars (complex natural plant sugars), trace elements, enzymes -that are in an easily assimilable form. Even though it is single-celled, Spirulina is relatively large, attaining sizes of 0.5mm in length. This is about 100x the size of most other algae, which makes some individual Spirulina cells visible to the naked eye. Furthermore, the prolific reproductive capacity of the cells and their proclivity to adhere in colonies makes Spirulina a large and easily gathered plant mass. The algae are differentiated according to predominating colorations, and are divided into bluegreen, green, red and brown. Spirulina is one of the blue-green algae due to the presence of both chlorophyll (green) and phycocyanin (blue) pigments in its cellular structure. Even though Spirulina is distantly related to the kelp algae, it is not a sea plant. However, the fresh-water ponds and lakes it favors are notably more alkaline -in the range of 8 to 11 pH than ordinary lakes and cannot sustain any other forms of microorganisms. In addition, Spirulina thrives in very warm waters of 32 to 45? C (~85 to 112?F, and has even survived in temperatures of 60? C (140?F) [30].

Certain desert-adapted species will survive when their pond habitats evaporate in the intense sun, drying to a dormant state on rocks as hot as 70?C (160?F). In this dormant condition, the naturally bluegreen algae turns a frosted white and develops a sweet flavor as its 71 % protein structure is transformed into polysaccharide sugars by the heat. Some scientists speculate that the "manna" of the wandering Israelites, which appeared miraculously on rocks following a devastating dry spell and was described as tasting "like wafers made with hone" may have been a form of dried, dormant Spirulina. This ability of Spirulina to grow in hot and alkaline environments ensures its hygienic status, as no other organisms can survive to pollute the waters in which this algae thrives. Unlike the stereotypical association of microorganisms with "germs" and "scum", Spirulina is in fact one of the cleanest, most naturally sterile foods found in nature. Its adaptation to heat also assures that Spirulina retains its nutritional value when subject to high temperatures during processing and shelf storage, unlike many plant foods that rapidly deteriorate at high temperatures.

Spirulina is also unusual among algae because it is a "nuclear plant" meaning it is on the developmental cusp between plants and animals. It is considered somewhat above plants because it does not have the hard cellulose membranes characteristic of plant cells, nor does it have a well-defined nucleus. Yet its metabolic system is based on photosynthesis, a process of direct food energy production utilizing sunlight and chlorophyll, which is typical of plant life forms. In essence, Spirulina straddles that fork in evolutionary development when the plant and animal kingdoms differentiated. Thus it embodies the simplest form of life. In contrast, other algae such as Chlorella have developed the hard indigestible walls characteristic of plants.

Recent advances in biochemistry and molecularly biology techniques provide new, powerful tools for studying the antioxidant enzymes and for elucidating the mechanisms of the actions of antioxidants. Thus the future of antioxidants hold promise to ensure a better, disease-free lifestyle for mankind by scavenging free radicals and consequently VI.

8 Therapeutic Significance of Gooseberry (Aaonla/Amla)

The medicinal, culinary, cosmetics, aromatic and sacred applications of plants ware well known to Ayurveda practitioners. Gooseberry, Indian gooseberry, is such potent gift of nature to humankind. It contributes toward health and longevity and is an indispensable part of Ayrvedic and Unani system of medicine. Scientific name of this tree is Emblica officinalis. It is referred to in ancient text as the best medicine to prevent aging.

9 VII.

10 Constituents & Applications of Gooseberry

One of the most popular vitamins prominent in most skin care products is ascorbic acid (vitamin C). Gooseberry contains 20x the amount of vitamin C found in oranges. This anti aging vitamin has been studied and confirmed as being an extremely effective addition to skin care routines as it is necessary for the synthesis of inter-cellular cement 'collagen'. Collagen is produced by the skin naturally and no creams or lotions can replace collagen. External application of collagen has absolutely no effect on the skin. Our skin doesn't have the ability to absorb collagen; it can only produce the same naturally. Collagen is responsible for maintaining the skin's elasticity; it keeps the skin supple and prevents cell degeneration which is the main cause of aging. When antioxidant vitamin C is added to skin, it helps our skin get rid of free radicals. Since free radicals can greatly damage our skin, the use of vitamin C is vital to our skin cells health. Vitamin C also helps to break up dead skin cells to reveal a smooth, bright complexion.

11 Figure 4 : Exotic Variety of Gooseberries

It has now been reported that people who eat plenty of vitamin C-rich food have fewer wrinkles than people whose diet contained little of it. Relative to this, they also observed that if Gooseberry is taken regularly as dietary supplement, it counter acts the toxic effects of prolonged exposure of environmental heavy metals like Pb (lead), Al (aluminium) and Ni (Nickel) which cause environmental damages globally especially as researchers

11 FIGURE 4 : EXOTIC VARIETY OF GOOSEBERRIES

cautioned that when Gooseberry is dried in shade then much of the vitamin C is retained, to get the maximum out of Gooseberry it should be taken raw with little salt.

According to ancient Indian Ayurvedic principles, Gooseberry has the ability to rejuvenate not only skin but also the heart and bones. Since free radicals can greatly damage our skin, the use of vitamin C is vital to our skin health. Vitamin C also helps to break up dead cells to reveal a smooth, bright complexion. Researchers now report that people who eat plenty of vitamin C-rich food have fewer wrinkles than people whose diet contained little of it. Relative to this, they also observed that if Gooseberry is taken regularly as dietary supplement, it counteracts the toxic effect of prolonged exposure to environmental heavy metals like lead, aluminium and nickel which cause environmental damages globally especially as researchers cautioned that when Gooseberry is dried in the shade then much of the vitamin C is retained. To get the maximum out of Gooseberry it should be taken raw with very little salt. It is often used in the form of pickles and is dried and powered. It is used in general vitality tonics. Gooseberry is low in sugar and high in fibre which is yet benefit of Gooseberry. It also aids metabolism.

Gooseberry contains 720 mg of vitamin C/ 100 g of fresh fruit pulp, or up to 900 mg per 100 g of pressured juice which is required for good vision and mental development.

It also aids metabolism. Gooseberry contains 720 mg of vitamin C/ 100 g of fresh fruit pulp, or up to 900 mg/ 100 g of pressed juice which is required for good vision and mental development. Gooseberry contains gallic acid, tannic acid, albumin, cellulose and minerals. Due to tannins, even dried form retains most of the vitamin content. Gooseberry normalizes body function, balances the neuroendocrine system and improves immunity. Gooseberry normalizes body function, balances the neuro-endocrine system and improves immunity. Gooseberry's hair tonic is one of the best-kept secrets of Indian beauty, and it's one of the ways women keep their hair so shiny and strong (aside from fabulous genetics, of course).

Hair tonic is one of the best-kept secrets of Indian beauty, and it's one of the ways women keep their hair so shiny and strong (aside from fabulous genetics, of course). Indian gooseberry is an accepted hair tonic in traditional recipes for enriching hair growth and pigmentation. The Gooseberry, cut into pieces is dried preferably in the shade. These pieces are boiled in coconut oil till the solid matter becomes charred. This darkish oil is excellent in preventing greying. The water in which Gooseberry pieces are soaked overnight is also nourishing to hair and can be used for the rinse while washing the hair. Gooseberry is believed to enhance hair growth by stimulating the scalp, so it's often recommended for women suffering from thinning hair.

To add volume, mix the powder with water to make a paste to the consistency of yogurt and let it sit for about 15 minutes to allow the powder to dissolve. To add volume, mix the powder with enough water to make a paste to the consistency of yoghurt and let it sit about 15 minutes to allow the powder to dissolve. Apply it to hair; let it soak in for a few minutes and then rinse. It is often used in the form of pickles and it is dried and powdered. The berry may also be used as vegetable. It is boiled in a small amount of water till soft and taken with a little salt. Let it soak in for a few minutes and then rinse. It stops hair loss and encourages nail and hair growth. It is used in general vitality tonics. It is also used in Trifla powder. It can be mixed with henna, basil and other herbs and be applied in hair in paste form. It is also used in trifla powder. It can be mixed with henna, basil and other herbs and applied in hair in paste form. This cures hair fall, hair greying. It dyes, beautifies hair and rids numerous hair ailments.

Gooseberry oil is one of the world's oldest natural hair conditioners. As an Indian herb, Gooseberry oil has been used since a very long time. It is used as hair oil basically for its cooling effect. It instantly penetrates the cuticle and fills it out. It moisturizes and hydrates the hair which adds volume naturally. It can also restore total shine and manageability without chemicals leaving the hair soft and renewed. It provides nourishment to hair roots, improves blood circulation in the scalp and will instantly stop premature greying and hair loss. It has s a host of antibacterial and antifungal activities thus eliminating dandruff in the scalp and psoriasis. In India, it was known as miracle fruit. According to 5000 year Indian Myth, it was considered as the nectar of the Gods because of the way it magically makes hair grows thicker, stronger and more manageable.

Indian gooseberry is beneficial in the treatment of respiratory disorders. It is especially valuable in tuberculosis of the lungs, asthma and bronchitis. Gooseberry, due to its high vitamin C content, is effective in controlling diabetes. A tablespoon of its juice mixed with a cup of bitter gourd juice, taken daily for two months will stimulate the pancreas and enable them to secrete insulin, thus reducing the blood sugar in the diabetes. Diet restrictions should be strictly observed while taking this medicine. It will also prevent eye complication in diabetes. Indian gooseberry is considered an effective remedy for heart disease. It tones up the functions of the organs of the body and builds up health by destroying the heterogeneous or harmful and disease causing elements. It also renews energy and possesses revitalizing effects.

The juice of Indian gooseberry with honey is useful in preventing eyesight. It is beneficial in the treatment of conjunctivitis and glaucoma, it reduces intraocular tension in a remarkable manner. A cup of juice with honey can be taken twice daily for this condition. To treat rheumatism a teaspoon of the powder of dry fruit mixed with 2 teaspoons of jaggery can be taken daily for two months. As an extremely rich source of vitamin C, Indian gooseberry is one of the best remedy for scurvy. Powder of this fruit, mixed with an equal quantity of sugar can be taken in doses of 1 teaspoon, thrice daily with milk. It has a host of antibacterial and antifungal activities thus dandruff in the scalp and psoriasis as well. In India, it was known as miracle fruit. According to 5000 year old Indian Myth, it was considered as the nectar of the Gods because of the way it magically makes hair grows thicker, stronger and more manageable. Indian gooseberry is beneficial in the treatment of respiratory disorders.

It is especially valuable in tuberculosis of the lungs, it strengths the lungs, helping to fight chronic lung problems as well as upper respiratory infections.

Gooseberry leaves are useful in ophthalmic and incipient blindness. People use the fresh leaf juice of Gooseberry for wound dressing. According to traditional healers the fresh leaf juice is good hair tonic and they also used the leaves in hair tonic like its fruits. This combination is a boon for leprosy patients. The application increases the rate of healing. The application increases the rate of healing. Gooseberry root and bark are used in scorpion bite. Gooseberry seeds are acrid, and useful in treatment of asthma, bronchitis, leucorrhoea, etc. Many healers use Gooseberry seeds in treatment of diabetes. The seeds are also used in treatment of Epistaxis. The seed powder mixed with honey is considered as good for gynaecological troubles especially in case of leucorrhoea. In case of vomiting, the traditional healers recommended it with common herb Lal Chandan (Pterocarpus santalinus). Fresh leaves are eaten in combination with fresh curd or whey to treat stomach related diseases and diarrhoea. The traditional healers use the leaves in different ways. For treatment of Epistaxis, they apply the fresh leaf juice with camphor on head [35].

12 VIII.

13 Therapeutic Significance of Broccoli

As the growing industrialization is continuously spitting out carcinogens into our environment and cancer of various hues are spreading their tentacles to take an ever increasing toll on human life, an apparent relief has been discovered in lowly fruits and vegetables rich in antioxidants, polyphenols and other cancer preventive chemicals. Among these, Italian broccoli, which is simply called as broccoli, a vegetable belonging to the Brassicaceae family has proved to be a most potent one. Besides, the unique anti-cancer and other medicinal properties, it is also rich in various

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Volume XIII Issue VII Version I Year ( ) B nutrients, (depicted in table) that can ensure sound health and long life. Particularly, its vitamin C content is very high. One hundred grams of broccoli contains enough vitamin C to meet the daily requirement of an adult person. This cool-weather crop is rich in vitamin C, folic acid and water soluble dietary fibres. It contains a number of nutrients with potent anti-cancer properties including diindolyl methane and selenium (Se). Particularly, 3, 3' -diindolyl methane is an active modulator of the innate immune response system with anti-viral, anti-bacterial and anti-cancer activities. Like other brassica vegetables broccoli is also rich in glucosinolates, which are metabolized to cancer preventive substances like isothiocyanates. Glucoraphanin, compound present in it can be processed into sulphoraphane, a well known anti-cancer agent. Broccoli leaf is edible and it contains a lot of ?carotene. Therefore, a high intake of broccoli has been found to reduce the risk of many types of cancer, especially prostate cancer. Recently, a research team from the NCI (National Cancer Institute) has found that eating broccoli and cauliflower once a week, decreases the aggressiveness of the disease by 45% to 52%. Similar effects have also been observed in case of colon cancer.

Figure **??** : Exotic Variety of Broccoli Methods of storage and cooking have varying impacts on anti-cancer effects of broccoli. Domestic storage of the vegetable shows only minor loss of glucosinolate levels over 7 days. However, when stored at a much lower temperature the loss may be up to 33% by fracture of vegetable material during thawing. On the other hand, a total loss of 77% glucosinolate has been observed after boiling it for 30 minutes, but steaming for 2 minutes, microwave cooking for 3 minutes and stir-fry cooking for 5 minutes do not have any significant effects on those, except when the vegetable is finally shredded. Therefore, in order to derive the maximum benefits from broccoli the later three methods of cooking should be done with less water, which should be consumed along with the vegetables and the boiling time should also be reduced [60]. This cool-weather crop is rich in vitamin C, folic acid and soluble dietary fibres. It contains a number of nutrients with potent anti-cancer properties, including diindolyl methane and Se. Many healers use the Gooseberry seeds in treatment of diabetes. The seeds are also used in treatment of epistaxis. The seed powder mixed with honey is considered as good for gynaecological troubles especially in case of leucorrhoea. In case of vomiting, the traditional healers recommend it with common herb Lal Chandan (Pterocarpus santalinus). Fresh laves are eaten in combination with fresh curd or whey to treat stomach related diseases and diarrhea.for treatment of Epistaxis, the fresh leaf juice with camphor is applied on head.

15 IX.

16 Phytochemical Significance of Garlic

Garlic has long been used throughout the world in cooking as well as in medicine. From the earliest times garlic has been used as a food. It formed part of the diet of the Israelites in Egypt and of the laborers employed by Khufu in constructing the pyramid. Garlic is still grown in Egypt, but the Syrian variety is the kind most esteemed now (Figure 1). It was consumed by the ancient Greek and Roman soldiers, sailors and rural classes and, according to Pliny the Elder by the African peasantry. Galen eulogizes it as the "rustic's theriac" and Alexander Neckam, a writer of the 12 th century application in confluent smallpox, and some dropsies cured

by it alone, were also found. Early in the 20th century, it was sometimes used in the treatment of pulmonary tuberculosis or phthisis. There are more than 60 varieties of Garlic grown throughout the world. Health science experts have linked longevity to Garlic consumption. Snow Mountain Garlic from J & K has been clinically established to be the world's best garlic in terms of purity and potency. J & K garlic is the most unique rare herb on earth as it can only be grown successfully into a full plant in the snow mountain of the Himalayas at 6,000 feet above sea level and where oxygen is much less. This species has the ability to survive in very little oxygen and in extremely cold environment -up to 10? C. When spring arrives, the melting snow provided more than adequate water for enhanced plant maturity. Thus, the garlic bulb contains water/liquid from the Himalayan snow in its purest natural form Because of its ability to increase plant vessel capillary action viz. to transport soil nutrients to the top most part of the plant for maximum growth, J & K garlic is observed to be a very efficient vessel dilator for improved blood vessel health and performance for human vital senses and organs. It is in this research for a period of 4 ½ years that J & K garlic is now cultivated for global consumption. For generation, people are not only using garlic because of its medicinal value, but traditionally, people have rubbed their bodies with it, buried it besides their bodies in coffin, worn it around their necks, draped it on household walls and even prayed to it. This great bulb has a lot of benefits, because no other plant has been held out for so long as a cure for so many human ailments. That's why garlic has been considered as the "Wonder Drug". Garlic has been used medicinally for many years for treating bites, tumours, ulcers, snakebite, wounds, headaches, heart diseases, cancer, pimples, measles and many more. It exhibits antioxidant activity, is good for skin, and contains flavonoids, which are good for heart and body.

Garlic contains a range of compounds including "Allicin", which is a pungent oily liquid that gives crushed garlic cloves their characteristic smell, and has been shown to be the antibacterial agent due to its active sulphur. Garlic shows antifungal and antiviral properties. Raw garlic is very smelly, so in order to reduce it smell, you can simply add it to your gravy, salad dressings, to soup, yummy pizza or just garnish it before serving or have it in your own style. In summary, the garlic and its supplements have long been consumed in many cultures as a natural remedy against a range of human illnesses including bacterial, viral and fungal infections, hypolipidemic, antiplatelet, antitumoral, regulating blood pressure, lowering blood sugars, cholesterols levels and providing procirculatory effects. It is fascinating to observe how ancient cultures came to the same conclusion about garlics action and efficacy as confirmed from modern science.

Recent literature has pointed towards significant biological activity of these trisulphides and tetrasulfides found in various Allium species suggesting that a wide range of effects are caused by polysulfides.The biological activity of these polysulphides may include combination of several different cellular signalling pathways. Therefore, further research is required to understand mechanism action of polysulphides. Due to anti oxidative effects of AGE (Aged Garlic Extract) may help in preventing cognitive decline by protecting neurons from eurotoxicity, apoptosis and thus it may be beneficial in preventing ischemia/reperfusion related neuronal death and improve learning and memory. The possibility of herb-drug interactions, safety and efficacy should be discussed with health care professionals, because slight negligence in this regard can cause serious clinical consequences. Various therapeutic applications of garlic are concisely below.

Garlic is most well-known for its antibacterial and antiviral properties. They help control bacterial, viral, fungal, yeast and worm infections. Fresh garlic is thought to play a role in preventing food poisoning by killing bacteria like E. coli, Salmonella enteritidis, etc. The chemical ajoene found in garlic may help treat fungal skin infections like ringworm and athlete's foot. The anti-clotting properties of ajoene found in garlic help in preventing the formation of blood clots in the body. Hence, it may also increase the risk of bleeding after surgery. Angiotensin II is a protein that helps our blood vessels contract thereby increasing the blood pressure. Allicin in garlic blocks the activity of angiotensin II and helps in reducing blood pressure. The polysulphides present in garlic are converted into a gas called hydrogen sulphide by the red blood cells. Hydrogen sulphide dilates our blood vessels and helps control blood pressure. Garlic protects our heart against cardiovascular problems like heart attacks and atherosclerosis. This cardio-protective property can be attributed to various factors. With age, the arteries tend to lose their ability to stretch. Garlic may help reduce this and may also protect the heart from the damaging effects of free oxygen radicals. The sulphur-containing compounds of garlic also prevent our blood vessels from becoming blocked and slow the development of atherosclerosis (hardening of the arteries). The anticlotting properties of ajoene help prevent clots from forming inside the blood vessels.

Garlic has the ability to moderately lower our blood triglycerides and total cholesterol and reduce arterial plaque formation. Garlic is known to have antiinflammatory property. It can help the body fight against allergies. The anti-arthritic property of garlic is due to diallyl sulphide and thiacremonone. Garlic has been show to improve allergic airway inflammation (allergic rhinitis). Raw garlic juice may be used to immediately stop the itching due to rashes and bug bites. Daily use of garlic might reduce the frequency and number of colds. Its antibacterial properties help in treating throat irritations. Garlic may also reduce the severity of upper respiratory tract infections. Its benefits in disorders of the lungs like asthma, difficulty of breathing, etc. make it a priceless medicine. Its ability to promote expectoration makes it irreplaceable in chronic bronchitis.

Garlic increases insulin release and regulates blood sugar levels in diabetics. Applying fat dissolving garlic extracts to corns on the feet and warts on the hands is thought to improve these conditions. Daily intake of garlic has been found to lower risk of most types of cancer. This anti-cancer property is due to allyl sulphides found in garlic. PhIP, a type of HCS (heterocyclic amine), has been associated with increased incidence of

breast cancer among women. According to studies, diallyl sulphide found in garlic inhibits the transformation of PhIP into carcinogens. Ferroportin is a protein which helps in iron absorption and release. Diallyl sulphides in garlic increase production of ferroportin and help improve iron metabolism. Garlic's aphrodisiac property is due to its ability to increase the circulation. Simply put some crushed garlic clove directly on the affected tooth can help relieve toothaches due to its antibacterial and analgesic properties. But be aware that it can be irritating to the gum. It's believed that obesity is a state of long-term low-grade inflammation. According to recent research, garlic may help to regulate the formation of fat cells in our body. Pre-adipocytes are converted into fat cells (adipocytes) through inflammatory system activity. The anti-inflammatory property of 1, 2-DT (1, 2-vinyldithiin) found in garlic may help inhibit this conversion. This may help prevent weight gain.

17 X.

Recent Advances Concerning to Beneficial Applicability of Garlic [69][70] ? You can increase the health benefits you receive from garlic by letting it sit after you've chopped it or crushed it. If you give your chopped/crushed garlic time to sit before changing its temperature (through cooking) or its pH (through the addition of acidic food like lemon juice), it will give the alliinase enzymes in garlic an opportunity to work on behalf of your health. For example, in the absence of chopping or crushing, research has shown that just 60 seconds of immediate microwaving will cause garlic to lose some of its cancer-protective properties. Immediate boiling of whole, intact garlic will also lower these properties, as will immediate addition of a very low-acid ingredient like lemon juice. ? Some of garlic's unique components are most durable in food (versus processed extract) form. Allicin-one of garlic's most highly valued sulphur compounds-stays intact for only 2-16 hours at r. t. when it is present in purified (extracted) form. But when it's still inside of crushed garlic, allicin will stay viable for 2-1/2 days. ? Garlic may help improve your Fe (iron) metabolism.

That's because the diallyl sulfides in garlic can help increase production of a protein called ferroportin.

(Ferroportin is a protein that runs across the cell membrane, and it forms a passageway that allows stored iron to leave the cells and become available where it is needed.) ? In addition to being a good source of selenium, garlic may be a more reliable source as well. Garlic is what we call a "seleniferous" plant: it can uptake Se from the soil even when soil concentrations don'tt favor this uptake. ? The cardioprotective benefits of garlic may partly rest on the production of hydrogen sulphide (H2S) gas. Our RBCs (Red blood corpuscles) can take sulphur-containing molecules in garlic (called polysulphides) and use them to produce H2S. This H2S in turn can help our blood vessels expand and keep our blood pressure in check. Interestingly, some processed garlic extracts cannot be used by our red blood cells in the same way and do not seem to provide the same level of cardioprotection that is provided by garlic in food form. ? While still in its very early stages, research suggests that garlic consumption may actually help to regulate the number of fat cells that get formed in our body. 1, 2-DT (1,2-vinyldithiin) is one of the unique sulfur compounds in garlic that has long been recognized as having anti-inflammatory properties. But only recently have researchers discovered that some of our fibroblastic cells (called "preadipocytes") only evolve into full-fledged fat cells (called "adipocytes") under certain metabolic circumstances involving inflammatory system activity. 1, 2-DT may be able to inhibit this conversion process. Since obesity is increasingly viewed by researchers as a chronic state of lowgrade inflammation, the inflammation-related benefits of garlic's 1, 2-DT may eventually be extended into the clinical area of obesity.©

XI.

18 Conclusion

As the growing industrialization is continuously spitting out carcinogens into our environment and cancer of various hues are spreading their tentacles to take an ever-increasing toll on human life, a relief has been discovered in lowly fruits and vegetables rich in antioxidants, polyphenols and other cancer preventive chemicals. Oxidative damage is often the result of high levels of unhealthy free radicals in the body. Free radicals are unstable or highly reactive moieties that cause unhealthy effects to our body's metabolism. Getting enough antioxidants in our diet to promote healthier tissues is essential to reduce the unwanted effects of these free radicals. When antioxidant vitamin C is added to skin, it helps our skin get rid of free radicals. Since free radicals can greatly damage our skin, the use of vitamin C is vital to our skin cells health. Vitamin C also helps to break up dead skin cells to reveal a smooth, bright complexion. It's now reported that people who eat plenty of vitamin C-rich food have fewer wrinkles than people whose diet contained little of it.

Indian curries are incomplete without garlic -a simple ingredient with packed health benefits. It is very strong and bitter but adds an unbelievable flavour to the cuisine. Any description of garlic is incomplete without mentioning its medicinal values. This miracle herb Garlic has been used since time immemorial as a medicine to prevent or treat various diseases and conditions. Garlic has a variety of potent sulphur-containing compounds which are the reason for its characteristic pungent odour. Allicin, the vital compound among them, is known to have great anti-bacterial, anti-viral, anti-fungal and anti-oxidant properties. The benefits of allicin can be best garnered when it's finely chopped, minced or pureed and let sit for some time. Garlic is also a reliable source of Se. Allicin, along with other compounds like ajoene, alliin, etc. found in them also have an effect on the circulatory, digestive and immunological systems of our body and help in lowering blood pressure, detoxification, healing, etc. 100 grams of broccoli contains enough vitamin C to meet the daily requirement of an adult person

Gooseberry contains 720 mg of vitamin C/ 100 g of fresh fruit pulp, or up to 900 mg/ 100 g of pressured juice which is required for good vision and mental development. Antioxidants are molecules which can safely interact with free radicals and terminate the chain reaction before vital molecules are damaged. Although there are several enzyme systems within the body that scavenge free radicals, the principle micronutrient (vitamin) antioxidants are vitamin E, ?carotene, and vitamin C. Additionally, Se, a trace metal that is required for proper function of one of the body's antioxidant enzyme systems, is sometimes included in this category. The body can't manufacture these micronutrients so they must be supplied in the diet. [1] [2] [3]

1

Figure 1: Figure 1 :

[1] © 2013 Global Journals Inc. (US) © 2013 Global Journals Inc. (US) Natural Antioxidants and their Intrinsic Worth for Wellbeing

[2] © 2013 Global Journals Inc. (US)

[3] © 2013 Global Journals Inc. (US) © 2013 Global Journals Inc. (US) Natural Antioxidants and Their Intrinsic Worth for Wellbeing

2 

Figure 2: Figure 2 :

3 

Figure 3: Figure 3 :

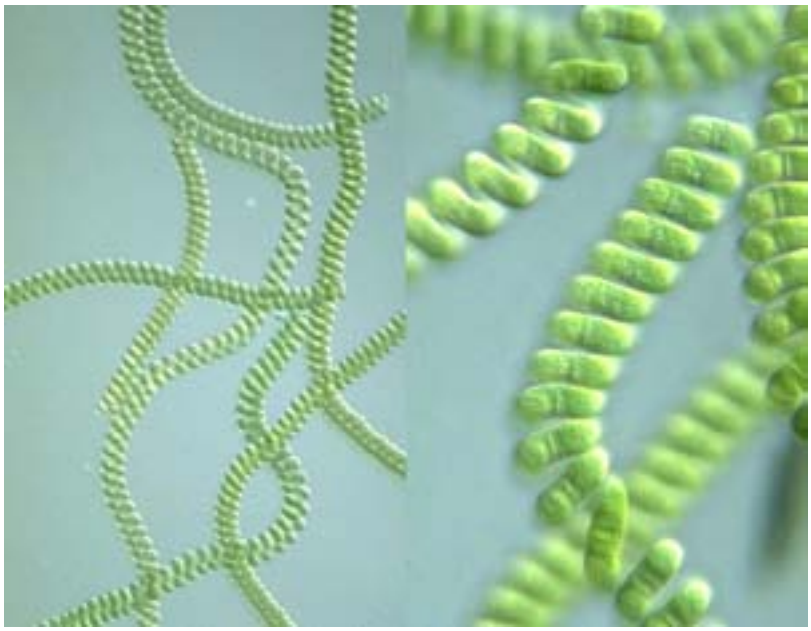

Figure 4:

1

Figure 5: Figure 1 :

Figure 6: B

(226mg); phosphorus (546mg); iron (8.5mg); iron (8.5mg); magnesium (236mg); copper (2.4mg); and sodium

Figure 7:

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