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HEALTH BENEFITS OF PHYTONUTRIENTS PRESENT IN A DIETARY MODEL

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Purpose: Phytonutrients serve in helping to protect the plants' vitality, they also provide health benefits to those who consume plant food. The purpose of this article is to evaluate the amount of phytonutrients and their medical benefits obtainable from the dietary model proposed earlier. **Methods:** The estimation of the above is interesting for people following my dietary model because it shows that people enjoying the above diet get tremendous medical benefits. For the evaluation, I have estimated the quantity of relevant vitamins, minerals, phenolic acid, flavonoid content and the antioxidant activity of each of the items in my proposed diet and presented their medical benefits. **Results:** From the estimation of phytonutrients, I have shown the daily supply of the above from my dietary model. **Conclusion:** The result shows that for people enjoying my diet chart get sufficient medical help to keep themselves active and healthy.

Keywords: Phytonutrients, Phenolic components, Flavonoids, Antioxidant activity

INTRODUCTION

In today's world, unrest in human mind is increasing very much. It is of no use, merely, advising people to be tolerant. We have to find out why people are becoming intolerant. There could be many reasons for intolerance in human behavior, but, in my view food habits could be one of them.

Srimat Swami Shibananda Saraswati (1949) has rightly suggested that Yoga practice along with vegetarian food habits lead to healthy and peaceful life for man kind.

Vegetarian diet has many advantages over non-vegetarian food (Srimat Swami Shibananda Saraswati, 1949; and Mc-cartney, 2008) and has been discussed in some detail in my article (Niyogi, 2015).

In that article (Niyogi, 2015), I have shown that an well planned vegetarian diet can supply all the necessary macronutrients for healthy and active living of people. Further studies (Niyogi, 2015) on the dietary model have

revealed that the diet plan suggested by me meets the major micronutrient requirement of mankind.

In an endeavor to make a complete analysis of the model (Niyogi, 2015), I have in this article tried to find out the phytonutrients (Tomovich and Jacobsen, 2014) and their medical benefits from the diet. Since the diet involves varieties of food, which contains legume, vegetables, cereal, diary product and fruits, I have searched the phytonutrient component of the above items separately and the consequent medical benefit.

RESULTS AND DISCUSSION

In this paper, I have presented the phytonutritious components of the basic ingredients of the diet separately and their health benefits.

The Prescribed Diet Contains

Legume

The varieties of legume present in my proposed diet are

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Bengal gram whole (chick pea), Green gram whole (Mungbean), Black gram whole, Red gram dhal, Dry pea, Black eyed bean (cowpea), Red kidney bean, Soybean and Lentil.

Each of the above items has high medicinal component, so, I shall treat them individually to find their bioactive component.

Bengal Gram Whole (Chickpea)

It contains (Khanna *et al.*, 2013)

Betacarotene-189 microgram/100 gm

Vitamin C-3 gm/100 gm

Vitamin E-0.35 mgm/100 gm

Iron-1.84 mgm/100 gm

Zinc-1 mgm/100 gm

Selenium-0.006 mgm/100 gm

The phenolic acid content (Sand and Jaganathan, 2013) consists of: 1) P-hydroxybenzoic acid, 2) vanillic acid, 3) syringic acid, 4) p-coumaric acid, 5) ferullic acid, and 6) genistic acid. The total phenolic acid content comes out to be 93.52 + -33GAE/100 gm. The chickpea contains flavonoids which are quercetene, myricetene, kaempferol, daidzein and genistein. The total flavonoid content is estimated to be (Zia-ul-Haq *et al.*, 2015).079 to.099 mg CAE/g (Catechin Equivalent/gm). They all have antioxidant activity and the total antioxidant activity (Han and Balk, 2008) is 2166.16 + -13.9 micromol TE/100 gm. Antioxidant nutrients are critical for the support of our body systems which include cardiovascular system, lungs and nervous system. Health benefits of chickpeas do not end here. Not only it lowers the risk of coronary heart disease, it helps in lowering weight. It prevents constipation, it inhibits anemia, and also gives protection against certain type of cancer.

Green Gram Whole

The nutrient contents of Green Gram Whole are:

Betacarotene-44 microgram/100 gm

Vitamin C-4.8 mgm/100 gm

Vitamin E-0.51 mgm/100 gm

Zinc-2.8 gm/100 gm

Iron-2.9 gm/100 gm

The phenolic acid content of Green Gram Whole consists

of tanic acid, genistic acid, p-coumaric acid, 2, 3, 5, resorcylic acid, protocatechuric acid, ferullic acid, caffeic acid, p-hydroxy benzoic acid and syringic acid. The total phenolic acid content of this gram turns out to be 193.59 + -6.3 GAE/100 gm. The flavonoid content of Green Gram Whole are vitexin and isovitexin. Total flavonoid content is 0.08 mg CAE/gm. As is obvious the above have antioxidant activity and the total antioxidant capacitor is 2985.48 + -12 micromol TE/100gm. Health benefit of Green Gram Whole is immense. It is a healthy weight losing food, it lowers the high cholesterol level, improves the flexibility of arteries and veins and also regulate the blood pressure. It checks blood sugar level. It is also antifungal, antibacterial and anticancer.

Black Gram Whole

The phytonutrient components of Black Gram Whole are:

Betacarotene-38 microgram/100 gm

Zinc-3.36 mg/100 gm

Iron-7.51 mg/100 gm

Vitamin C-0

Vitamin E-0

The phenolic acid components of the above are multivarious like gallic acid, ferullic acid, protocatechuric acid, genistic acid, syringic acid, caffeic acid and vanillic acid. From these, the total phenolic acid content of Black Gram Whole is 61.44 + -3.1 GAE/100 gm. The flavonoid components of Black Gram Whole are mainly Kaempferol-3-O robinobioside and Quercetin-3-O glucoside. The total flavonoid component is measured to be 1.49 and 2.10 mg rutin equivalent/gm. This gram has total antioxidant capacity of 2573 + -11.9 micromol TE/100 gm. The medical benefits of Black Gram Whole are multifunctional. To mention some of them, it can be said that it is used to treat nervous disorder, skin ailments, hair problem, digestive disorder, heart diseases, diabetics, rheumatism, body pain, sexual dysfunction and so on.

Red Gram Dahl

It contains:

Betacarotene-132 microgram/100 gm

Vitamin C- 39 mgm/100 gm

Vitamin E-0.39 mgm/100 gm

Zinc-2.76 mgm/100 gm

Iron-5.1 mgm/100 gm

The phenolic acid components of this dahl are: 1) chlorogenic acid 2) gallic acid 3) hydroxybenzoic acid and 4) syringic acid. The total phenolic component turns out to be 73.49 + -2.2 GAE/100 gm. The flavonoid contents of Red Gram Dahl are in three form like flavonols, quercetin and iso-quercetin which give the total flavonoid content as 1424 + -0.02 mgm/100 gm, while, the total antioxidant activity figures out to 1879.16 + -10.0 micromol TE/100 gm. Red Gram Dahl is used in the remedy of bronchitis, pneumonia, cough and cold. It heals tumors, abdominal pain, ulcers and enteritis, etc.

Lentil

It is a common item in North Indian, specially, Bengali food. The nutrients in lentil are:

Betacarotene-270 microgram/100 gm

Vitamin C-1.59 mgm/100 gm

Vitamin E-0.101 mgm/100 gm

Zinc-4.78 mgm/100 gm

Selenium-5.5 microgram/100 gm

and Iron-7.59 mgm/100 gm

Phenolic and flavonoid contents of lentil are numerous. The phenolic acid components are gallic acid, protocatechuric acid, 2-3-4 trihydroxybenzoic acid, p-hydroxybenzoic acid, genistic acid, vanillic acid, caffeic acid, chlorogenic acid, syringic acid, p, m, o coumaric acid, ferulic acid, salicylic acid, and sinnapic acid, while the flavonoid contents are catechin, epicatchin, myricetin, luteolin, quercetin and kaempferol. Total phenolic content is 12 mgm/gm, while total flavonoid content is 5.97 mgm CAE/gm. The total antioxidant capacity of the element is 14 micromol TE/gm. The health benefits of consuming lentils include lowering cholesterol which reduces the risk of heart disease and stroke, it prevents constipation, irritable bowel syndrome and diverti-culosis. It stabilizes blood sugar level and can be helpful for diabetic patients, and for those with insulin resistance or hypoglycemia. Lentil contains the third highest level of protein and is thus essential for vegetarians. It also helps in loosing weight, and due to its low calorie and no fat, it helps one feeling full and satisfied.

Dry Pea

In my daily chart of food, dry pea is one of the ingredients. One hundred grain of dry pea

Contains

Betacarotene-449 microgram

Vitamin C-40 mgm

Vitamin E-0.13 mgm

Zinc-1.24 mgm

Here, the phenolic acid content consist mainly of: Gallic acid, protocatechuric acid, syringic acid, vanillic acid, trans p-coumaric acid and transferulic acid, etc. The total phenolic acid content is 1.2 mgm/gm. The flavonoid content of dry pea are mainly from Daidzein, Genistein, Kaempferol and Apigenin. The flavonoid content turns out to be 0.08 mgm CE/gm. The total antioxidant activity in dry-pea is 1.9 micromol TE/gm. The highly nutritious content of dry-peas account for medicinal values and uses for heart diseases, diabetes, nervous system disorders and in case of pregnancy and lactation.

Cow-Pea (Black Eyed Bean)

It is also very important in making whole day diet.

100 gm of cow-pea contains (Self Nutrition Data):

Betacarotene-6.2 microgram

Vit C-0.7 mgm

Vit E-0.28 mgm

Zinc-1.87 mgm

Iron-3.05 mgm

The phenolic acid components are protocatechuric acid, caffeic acid, p-coumaric acid, ferullic acid, benzoic acid, and cinnamic acid. The total phenolic content (Dalaram and Potraviharstvo, 2015) is 72.195 + -2.5009 mg GAE/100 gm. The flavonoid, components are, to mention some, Kaempferol glycoside, isoquercetin and genistein. The total flavonoid content (Londonkar and Awanti, 2014) is 621 + -2.494 microgram RE/gm. The total antioxidant activity turns out to be (Zia-ul-Haq, *et al.*, 2013) 25.1 + -0.6 micromol TE/gm. The health benefits of cowpea are immense. It subordinates cholesterol level. Being rich in anti-oxidants, it guarantees curbing of the cancerous cells within the body. It has minimum fat content so helps weight loss. It is effective in assisting diabetic problems. Besides these, it is best for stomach, it removes harmful free radicals and thus prevents development of cancerous cells. Taking of cowpea in daily diet decreases the risk of heart diseases. Lignin, which is a component of cowpea, keeps a number of fatal diseases like

cancer, stroke, hypertension, osteoporosis etc away. Cowpea protects the body against a variety of illness, it delays signs of aging, keeps skin healthy, fights hair loss, boosts hair growth.

Soya Bean

One of the important beans I have included in my daily diet chart is soya bean.

One hundred gms of soyabean contain

Betacarotene-426 microgram

Vit C-6 mgm

Vit E-0.81 mgm

Zinc-4.89 mgm

Iron-10.4 mgm

The phenolic acid components of soyabean are protocatechuric acid, gallic acid, vanillic acid, cinnamic acid, chlorogenic acid, etc. Total phenolic content of this bean is $3.74 + -0.88 -27.05 + -1.74$ mgm GAE/gm. The flavonoids are flavone, apigenin, kaempferol, quercetin and myricetin. From these the total flavonoids comes out to be (Da Janta *et al.*, 2013) $1.46 + -0.00 -3.50 + -0.51$ mgm CE/gm, while the total antioxidant activity is $5246.81 + -14.8$ micromol TE/100 gm. Soyabeans are extremely important for vegetarians since it is very rich in protein. Health benefits of soyabeans are numerous. To mention some of them, we could say that it helps to prevent osteoporosis, boosts metabolic activity in body. It helps to lower cholesterol level, improves digestive and bone health, manages weight and diabetes, prevents neural tube defects in infants, heart attack and strokes, improves blood circulation and heart health, reduces risk of insomnia and sleep disorders, prevents onset of colorectal and colon cancer and relieves symptoms of menopause like mood swings.

Red Kidney Bean (Rajma)

Red Kidney bean, also called rajma is a good source of vitamin and minerals. So, I have Included it in my diet chart. Rajma is also very tasteful.

Hundred gram of Rajma contains:

Vit C-1.18 mgm

Zinc-4.5 mgm

Iron-5.1 mgm

Selenium-3.2 mgm

The phenolic acid components of rajma are ferulic acid, coumaric acid, sinapic acid, and cinnamic acid. The total phenolic content (Fidrianny *et al.*, 2016) is 3.09 gm GAE/gm. The flavonoid components are quercetin, kaempferol, diglycoside, isoflavene, daidzein, genistin, and glycyetin. Total flavonoid content is 8.69 gm QE/100 gm. The antioxidant activity comes from anthocyanin of 0-2.78 mgm/g. The total antioxidant capacity is $3084.65 + -8.5$ micromol TE/100 gm. Health benefits of red kidney beans are extraordinary. Being a good source of folate, it gives protection against heart diseases. It has tremendous antioxidant activity, thus it helps antiaging of human system. The fiber, protein and complex carbohydrates in rajma help stabilize blood sugar level and weight loss.

Having discussed the medical and health benefits of legumes present in my diet chart, I now switch over to the next item, i.e., vegetables in the diet. The vegetables are divided into: i) leafy vegetables, ii) root vegetables, and iii) other vegetables including mushroom and potato.

ia) Spinach it Contains

Betacarotene-5580 microgram/100 gm

Vit C-28 mgm/100 gm

Vit K-483 microgram/100 gm

Vit E-0.18 mgm/100 gm

Selenium-0.1 gm/100 gm

Zinc-1.30 mgm/100 gm

Iron-1.14 mgm/100 gm

The phenolic acid components of spinach are coumaric acid, ferullic acid, paracoumaric acid, etc., and the total phenolic content is (Pandjaitan *et al.*, 2005) $22.9 + -0.6 -24.9 + -0.8$ mgm GAE/gm. The flavonoid content is contributed from quercetin, kaempferol, etc., the total value of which is $12.3 + -0.3 -12.7 + -0.3$ mgm/gm. The total antioxidant activity of this vegetable is 119.0-288.8 micromol TE/gm. The benefits of taking spinach is multivarious some of which are: It is anti-inflammatory and anticancer, it can protect against age related eye problems, it plays important roles for maintaining bone health, gastrointestinal health, blood pressure, skin health, calcification and brain function.

ib) Red Spinach (Amaranth)

It contains:

Betacarotene-5520 microgram/100 gm

Vit C-4.2 mgm/100 gm

Vit E-1.19 mgm/100 gm

Zinc-2.87 mgm/100 gm

Iron-7.61 mgm/100 gm

The phenolic acid components of amaranth leaves are gallic acid, caffeic acid, ferulic acid, syringic acid, vanillic acid, p-coumaric acid and sinapic acid. The total phenolic acid content (Ahmed *et al.*, 2013) is 2.81 + -0.2 gm GAE/100 gm. The flavonoid content, which comes from isorhamnetin, kaempferol, quercetin and rutin gives the total flavonoid content as 18.4 + -0.30 QE gm/100 gm. The total antioxidant activity is evaluated (Nama *et al.*, 2014) as 1183 + -15.3 micromol TE/100 gm. As benefits of eating red spinach, it may be mentioned that it aids digestion, treats anaemia and Dysentery, cures kidney problems, and aids good vision. For losing weight and strong hair it has application. A paste of amaranth can be used as external remedy of poisonous bites from snakes and reptiles. It also cures fever.

ic) Water Spinach

Water spinach leaves contain per 100 gm of the same as

Betacarotene-1260 microgram

Vit C-59 mgm

Vit E-0.0 mgm

Zinc-0.18 mgm

Iron-71 mgm

Phenolic acid components are gallic acid, and chlorogenic acid. Total phenolic content of water spinach is (Umar *et al.*, 2013) 1.890 to 1.987 mgm GAE/mg. The flavonoid content comes from myricetin, quercetin, luteolin, apigenin and kaempferol yielding total flavonoid content as (Hwang *et al.*, 2005) 6.50 + -0.15 micromol/gm. The antioxidant activity of water spinach (Sharmin *et al.*, 2011) is as high as 8328.80 + -29.15 micromol TE/gm. Health benefits of water spinach are spectacular as it reduces cholesterol, it is used in treatment of jaundice, liver problems, anaemia, indigestion and constipation. It is antidiabetic, it protects against heart diseases, prevents cancer and it is beneficial for eyes. It boosts the body's immunity. It has antiaging benefits and can be used for treatment of skin diseases and protecting hair and its growth.

id) Moringa Leaf

Moringa leaves are rich in vitamins and minerals. 100 gm of the leaves contain

Betacarotene-1412 microgram

Vit C-106.95 mgm

Zinc-0.6 mgm

Iron-4 mgm

Selenium-15 microgram

Phenolic acid components of moringa leaves are gallic acid, chlorogenic acid, ellagic acid and ferulic acid. Total phenolic acid content is (Vonasak *et al.*, 2013) 13.23 gm clo AE/100 gm. The total flavonoid content is 6.20 QE/100 gm and total antioxidant activity is (Pari *et al.*, 2007) 0.636 micromol TE/mg. In a word, medical benefits of moringa leaves know no bound. To mention some of the benefits I may say that it is used to treat anxiety, diabetes, diarrhea, dysentery and colitis. Eating leaves is recommended in case of gonorrhoea, it is used in headache and glandular swelling, it is skin antiseptic. Moringa leaves are used to treat fevers, bronchitis, ear and eye infections, etc. The leaves are considered to be able to kill intestinal worms, they are purgative, they increase woman's milk production and are prescribed for anemia.

ii) Carrot

One of the root vegetables, viz. carrot, is rich in vitamins and minerals.

They are

Betacarotene-1890 microgram/100 gm

Lutein Zeaxanthin-256 microgram/100 gm

Vit C-5.9 mgm/100 gm

Vit E-0.60 mgm/100 gm

Zinc-0.24 mgm/100 gm

Iron-0.3 mgm/100 gm

Selenium-0.9 mgm/100 gm

The phenolic acid components of carrot are hydroxycinnamic acid, chlorogenic acid, caffeic acid, p-hydroxybenzoic acid and ferulic acid. The total phenolic acid content is measured as (Chatatikun and Chiabchalard, 2013) 30.7 + -3.1-35.9 + -4.0 mgm GAE/gm. The flavonoid components are quercetin, catechin, kaempferol, apigenin and anthocyanin. The total flavonoid content is evaluated as 35.3 + -6.8 mgm QE/gm. The total antioxidant activity of carrot is (Urrea *et al.*, 2011) 131.5 + -7.3 mg TE/100 gm. Most benefits of carrots are from betacarotene and fiber content.

Carrot facilitates digestion, it reduces blood pressure and regulates blood sugar levels consequently prevents stroke and diabetes. It prevents cancer and it is an all round vision booster. It stimulates gums and induces excess saliva.

ii b) Colocasia

Another important ingredient of MSM is colocasia which is rich in vitamins and minerals.

100 gm of colocasia contains:

Betacarotene-24 microgram

Cryptoxanthin-20 microgram

Vit C-4.5 mgm

Vit E-2.30 mgm

Zinc-0.23 mgm

Iron-0.55 mgm

Selenium-0.7 microgram

Phenolic acid component of colocasia is hydroxycinnamic acid and the total phenolic acid is (Simsek and Nehire, 2015) 205 + -53 mgm CAE/100 gm. Flavonoid contents of this element are complicated compounds like flavons-mono and di-c-glycoside, etc. The total flavonoid is 61 + -9 mgm CAE/100 gm. The total antioxidant activity ranges from 244 + -73 milli-mol TE AC/100 gm to 452 + -72 millimol TE AC/100 gm. Health benefits of colocasia are numerous. It lowers blood pressure, lessens cardiac diseases, gives stronger immune system, and reduces weight gain. Taking of this ingredient reduces fatigue and aging effects. There are many more benefits which can be discussed elsewhere.

ii c) Radish

Radish is a cheap vegetable, and it is available everywhere in India. This vegetable is rich in vitamins and minerals, consequently, it has been included in MSM.

100 gm of the vegetable contains:

Betacarotene-3 microgram

Vit C-14.8 mgm

Sulphoraphane-12050 microgram in dry weight

Zinc-0.3 mgm

Selenium-0.7 mgm

The phenolic acid components of radish are numerous some of which may be cited as genistic acid, vanillic acid,

syringic acid, p-coumaric acid, ferulic acid, sinapic acid and salicylic acid. The total phenolic acid content (Kim *et al.*, 1999) is 124.46 + -6.13 to 160.38 + -5.0 mgm GAE/gm. The flavonoid components are kaempferol-3,7,diglycoside and pelargonidin-9-diglycoside with -5-glucoside. The total flavonoid content is 16.26 + -1.89 to 42.93 + -1.58 mgm RE/gm and the total antioxidant activity is 1686 + -7.7 micromol TE/100 gm. Health benefits of radish include the treatment or prevention some ailments and body parts like jaundice, piles, urinary disorder, weight loss, cardiovascular conditions, cancer, leucoderma, constipation, respiratory disorder, blood pressure, diabetes, skin disorder, fever, kidney dis-order, insect bites and dehydration. It is also useful for respiratory condition, liver and gallbladder.

iiia) Brinjal

In my daily diet, I have chosen the vegetables which are easily available and at the same time cheap. One of them is brinjal.

Hundred gm of brinjal contains:

Betacarotene-30 microgram

Vit C-1.43 to 16.75 mgm

Vit E-0.30 mgm

Zinc-0.16 mgm

Iron-0.24 mgm

The phenolic acid components of brinjal are chlorogenic acid, iso-chlorogenic acid, hydroxycinnamic acid and caffeic acid resulting in the total phenolic acid content as (Somawanthi *et al.*, 2014) 48.17 + -0.27 to 61.11 + -0.26 mgm GAE/100 gm. The flavonoid components are quercetin-3-glucoside, quercetin-3-rhamnoside, and myricetin-3-galactoside. The flavonoid content by DPPH turns out (Koindoliya *et al.*, 2015) to be 7.42 to 13.25 mgm/100 gm and the total antioxidant activity is 4054.4 + -179.3 to 4541.2 + -204.1 micromol TE/kg. Researches have shown that consumption of brinjal decreases the risk of obesity, overall mortality, diabetes and heart disease, promotes a healthy complexion and hair. It also protect body cells from damage caused by free radicals and thus prevents tumor and spread of cancer cells. It also promotes death of cancer cells.

iiib) Pumpkin

Wonderingly, the most common vegetable pumpkin contains lots of vitamins and minerals. Hundred gms of pumpkin contain

Betacarotene-738 mgm
Cryptoxanthin-2145 microgram
Lutein-Zeaxanthin-1500 microgram
Vit C-9 mgm
Vit E-1.06 mgm
Zinc-0.32 mgm
Iron-0.80 mgm
Selenium-0.3 microgram

The phenolic acid components are p-hydroxybenzoic acid, vanillic acid, chlorogenic acid, syringic acid, ferulic acid etc. The total phenolic acid content is (Zdunic *et al.*, 2015) 905.9 microgram GAE/gm. The flavonoid components are quercetin, apigenin and kaempferol. The resulting flavonoid content (Sinha *et al.*, 2005) is 0.8 mgm CE/100 gm and the total antioxidant activity is (Tiveron *et al.*, 2012) 5.8 + -0.095 micromol TE/gm. There are so many health benefits from intake of pumpkin. It decreases the risk of obesity and overall mortality, diabetes, heart disease, and promotes a healthy complexion and hair. Being a good supplier of betacarotene, it may reduce the risk of prostate cancer, colon cancer. Intake of large quantity of pumpkin decreases the risk of and progression of age related macular degeneration. It helps in promoting fertility of child bearing women. It offers an immunity boost from its powerful combination of nutrients.

iiic) Tomato

The peculiar taste and syrupy composition makes tomato appear in most of the vegetable dishes. One hundred gms of tomato contain:

Betacarotene-351 mgm
Lutein-Zeaxanthin-123 microgram
Vit C-18.9 mgm
Vit E-0.8 mgm
Lycopene-2573 microgram
Zinc-0.17 mgm
Iron-0.4 mgm

The phenolic acid contents of tomato are caffeic acid, chlorogenic acid, coumaric acid and ferulic acid. The total phenolic acid content is (Marsic *et al.*, 2011) 2.31 to 4.90 mgm CAE/100 gm. The flavonoid comes from Quercetin-

glycoside and kaempferol-glycoside. The total flavonoid content is 4 to 26 mgm/100 gm and the total antioxidant activity is (Nascimento *et al.*, 2013) 7.77 + -0.01 micromol TE/100 gm. The tremendous health benefits of taking tomato can be associated with the decrease of risk from heart disease, diabetes, and cancer both prostate and colorectal ones. It helps the hydration of human system and minimizes constipation. It protects the eyes against cataracts, scurvy. The folic acid in tomato helps in controlling depression by preventing an excess of homocysteine from forming in the body, thus, helps in the production of good hormones like serotonin, dopamine, and norepinephrine.

iiid) Papaya

Papaya is very important ingredient in my diet material.

100 gm of papaya contains:

Betacarotene-132 mgm
Vit C- 61.7 mgm
Vit E-0.7 mgm
Zinc-0.7 mgm
Iron-0.1 mgm
Selenium-0.5 mgm

Phenolic acid components of papaya are caffeic acid, protocatechuric acid, sinapic acid, ferulic acid and gallic acid. Total phenolic acid content is (Maisarah *et al.*, 2014) 379.91 mgm GAE/100 gm. Flavonoid contents are quercetin, myricetin, isorhamnetin and kaempferol. Total flavonoid content is 53.44 + -6.63 mgm GAE/gm. The total antioxidant capacity is (Zuhair *et al.*, 2013) 1427 + -0.20 mgm/100 gm. Papaya's nutrition benefits are awesome. It is useful against pimples, acne and other skin infections. It is used for glowing of skin, i.e., why papaya is used by beauty product companies. It cures menstrual pains, controls bowel movements, protects from heart disease, burns calories and extra fat, and is a sure item for ulcer patients.

iv) Potato

Potato is a common item in vegetables.

One hundred gm of potato contains
Betacarotene-24 microgram
Lutein Zeaxanthin-21 microgram
Vit C-17 mgm

Zinc-0.53 mgm

Iron-0.73 mgm

The phenolic acid components of potato are neochlorogenic acid, cryptochlorogenic acid, chlorogenic acid, caffeic acid and ferulic acid. The total phenolic acid content is (Valcarcel *et al.*, 2015) 3.6 to 12.6 mgm GAE/gm. The flavonoid components are quercetin-3-rutinoside quercetin-3-diglycoside quercetin-3-glucosylrutinoside kaempferol-3-rutinoside. The total flavonoid content turns out to be 2.3-9.5 mgm CE/gm and the total antioxidant activity is 4.9 to 18.5 mgm TE/gm. Potatoes are primarily made of carbohydrates and very little protein. So it can be used to put weight gain and digestion. It is a good skin care agent and prevents scurvy. The other benefits include protection against rheumatism and in reducing inflammation, both internal and external. The presence of Zea-xanthin and carotene in potatoes gives protection against cancer. It can be used to relieve high blood pressure due to tension. It regulates brain function, prevents heart diseases. It prevents kidney stones and diarrhea.

v) **Mushroom**

Mushroom is a special item in the vegetable category containing ergothioneine which is a sulphur containing amino acid that function as an antioxidant of amount 0.2 to 0.4 mgm/gm.

Vit C-2.14 mgm/100 gm

Zinc-0.5 mgm/100 gm

Iron-0.4 mgm/100 gm

Selenium-0.32 mgm/100 gm

The phenolic acid components are p-hydroxy benzoic acid, p-coumaric acid and cinnamic acid. The total phenolic acid content is (Chuwong *et al.*, 2013) 0.90 to 6.03 mgm GAE/gm. The flavonoid contents are myricetin and catechin. The total flavonoid content is 0.17 to 6.95 mgm QE/gm. The antioxidant capacity (Keles *et al.*, 2011) of mushroom is 12171.43 to 62771.43 micromol/gm. Mushrooms can help to lower cholesterol levels. Since mushrooms are good source of iron, they are antianemic. They have anticarcinogenic effects, so protect from breast and prostate cancer. They are ideal lowenergy diet for diabetes, can help in bone health. They support immunity system strength and reduce blood pressure, help weight loss.

vi) **Fruits**

Fruits are essential in daily diet, as, they can support active

living for human being. Some of the fruits I have suggested in the dietary model are:

via) **Guava**

It is in one of the common fruits in India which is easily available. One hundred gms of guava contains:

Vit A-974 microgram

Vit C-228 mgm

Vit E-0.73 mgm

Zinc-0.23 mgm

Iron-0.26 mgm

Selenium-0.1 mgm

Phenolic acid contents of guava are gallic acid, hydroxybenzoic acid, vanillic acid, caffeic acid, syringic acid, p-coumaric acid, ferulic acid and sinapic acid. The total phenolic acid content comes out to be (Sanguansil *et al.*, 2014) 168.21 + - 49.47 mgm GAE/100 gm. The flavonoid contents are myricetin-glycoside, quercetin, kaempferol, and isorhamnetin, which give the total flavonoid content as 41.51+14.98 mgm CE/100 gm. The total antioxidant activity is (Ali *et al.*, 2010) 176.06 + -1.92 mgm TE/100 gm. Guava is a healthy fruit. It is an immunity booster and protects us from infections and pathogens. It lowers risk of cancer, and prevents diabetes. Guava helps lowering the triglyceride level and bad cholesterol (LDL) which contribute to heart disease. This fruit improves good cholesterol (HDL) level. Guava can be used to treat constipation and in improving eye sight. Pregnant women are recommended guava, which can help the development of baby's nervous system. It beats toothache, combats stress. It is good for brain and in weight loss. It can treat cough and cold. Guava has antiaging properties and increase radiance and freshness of skin.

vib) **Banana**

Banana can be used as substitute for carbohydrate food.

100 gms of banana contains

Betacarotene-78 microgram

Lutein-Zeaxanthin-22 A microgram

Vit C-8.7 mgm

Vit E-0.1 mgm

Zinc-0.15 mgm

Iron-0.26 mgm

Selenium-1 microgram

The phenolic acid contents are gallic acid, hydroxybenzoic acid, chlorogenic acid, vanillic acid, caffeic acid, syringic acid, p-coumaric acid and ferullic acid. The total phenolic acid content is (Ibukun *et al.*, 2012) 8.3 + -6.58 mgm GAE/gm. The flavonoid contents are aglycone, kaempferol, quercetin and myricetin. The total flavonoid content is 9.5 + -0.21 mgm QE/gm. Total antioxidant activity of banana is 28.67 + -0.09 mgm TE/100 gm. Multivarious health benefits of banana include blood pressure check, asthma inhibition, lowering risk of cancer, heart disease and diabetes. Banana can be used for diarrhea treatment, preserving memory and boosting mood.

vic) Mango

Mangoes are available in sufficient quantity in almost all the states of India. But it is a seasonal fruit mainly available from April to August.

100 gm of mango provide:

Betacarotene-640 microgram

Lutein-Zeaxanthin-23 microgram

Vit C-36.4 mgm

Vit E-0.9 mgm

Zinc-13 mgm and

Iron-0.16 mgm

The phenolic acid components are gallic acid, hydroxybenzoic acid and syringic acid. The total phenolic acid content is (Ibukun *et al.*, 2012) 145 mgm GAE/100 gm. The flavonoid components are catechin, quercetin, kaempferol, rhamnetin and anthocyanin, which give the total flavonoid content as 58 to 91 mgm CE/gm. The total antioxidant activity is 65.24 + -0.61 mgm TE/100 gm. Mango prevents cancer, lowers cholesterol(LDL), clears skin, promotes good eye sight, alkalizes the body, protects against diabetes, helps improve sex, digestion and immune system. Green mango juice is a remedy for heart stroke.

vid) Apple

Apple is a somewhat costly fruit in India, but due to its special quality(presence of anthocyanidin), I have suggested its intake in my diet.

100 gm of apple contains:

Betacarotene-27 microgram

Lutein Zeaxanthin-24 microgram

Vit C-4.6 mgm

Vit E-0.18 mgm

Zinc-0.4 mgm

Iron-0.12 mgm

Anthocyanidin-26.8 + -6.5 mgm

The phenolic acid components are salicylic acid, protocatechuric acid, p-coumaric acid, gallic acid, and sinapic acid. The total phenolic acid content is 125.4 mgm GAE/100 gm. The flavonoid contents are quercetin-glycoside, procyanidin, epicatechin and phloridzin glycoside. The total flavonoid content is 48.6 mgm CE/100 gm. The total antioxidant activity is 55.06 + -0.25 mgm TE/100 gm. Apple consumption helps in improving neurological health, it prevents dementia, lowers the risk of stroke, and lowers level of bad cholesterol (LDL). It reduces risk of diabetes and wards off breast cancer. It is also observed to prevent obesity and its associated disorder.

vii) Parboiled Rice

Parboiled rice is the main food for Indian (specially Bengali people). It contains no betacarotene, Vit C or Vit E. 100 gm of it contains:

Zinc-3 mgm

Iron-1.46 mgm

Selenium-9.94 microgram

The phenolic acid components of rice are gallic acid, hydroxybenzoic acid, p-coumaric acid, ferullic acid, caffeic acid, vanillic acid and sinapic acid. The total phenolic acid content is (Sreeramulu *et al.*, 2009) 50.87 + -1.99 mgm per 100 gm. The flavonoid contents are luteolin, apigenin, quercetin, isorhamnetin, kaempferol and myricetin. The total flavonoid content is 220.5 mgm QE/100 gm and the total antioxidant activity is 0.75 + -0.00 mgm TE per gram. Parboiled rice has low Glycemic Index (GI), so it is an important option for diabetic person. It is a rich source of B-vitamins. In a word it is very healthy to eat parboiled rice compared to untreated white rice.

viii) Wheat Flour

Wheat flour is one of the major food stuff for us 100 gm of the flour contains:

Betacarotene-29 microgram

Zinc-2.93 mgm

Iron-4.9 mgm

Selenium-70.7 microgram

The phenolic acid components of wheat flour are caffeic acid, ferullic acid, chlorogenic acid, cinamic acid, salicylic acid and p-hydroxybenzoic acid. The total phenolic acid content is (Li Yaoguang *et al.*, 2015) 313.9 to 744.7 microgram GAE/gm. The flavonoid components of wheat flour are numerous. Some of them are coumarin, stibene, pentonidin-3-rutinoside, and pentanidin-3-glucoside. The total flavonoid content is 108 to 376.1 micro-gram RE/gm. The total antioxidant activity is 13.5 to 44.9 micromol TE/gm. Wheat flour (atta) is very much a healthy food. It lowers the risk of developing metabolic syndromes, keeps body weight under control, protects the body against insulin resistance, low level of protective HDL cholesterol, high triglycerides, and high blood pressure. It lowers the risk of Type 2 diabetes. Wheat flour protects against heart disease, osteoporosis and alzheimer's disease. Wheat flour is high in bran content, so it has good laxative property, naturally protects against nausea, flatulence, constipation. It is also an anticancerous agent.

ix) Pea-Nut

Peanut is widely available in India. It is very much in use as a food item. One hundred gm of peanut contains:

Betacarotene-37 microgram

Vit E-26 mgm

Zinc-3.9 mgm

Iron-2.5 mgm

Selenium-2.5 microgram

Phenolic acid components of peanut are p-hydroxybenzoic acid, chlorogenic acid, ferullic acid, caffeic acid, p-coumaric acid and gallic acid. The total phenolic acid content is (Mondal *et al.*, 2015) 1.65 mgm GAE/gm. The flavonoid contents are catechin, epicatechin, quercetin, daidzein and lutelin. Consequently, the total flavonoid content is 240 microgram CE per gram. The total antioxidant activity is 1.27 to 4.40 milimol TE/gm. Peanut contains sufficient levels of monounsaturated fatty acids (MUF4) which helps in lowering bad cholesterol (LDL) and increasing good cholesterol (HDL), thus helps to prevent coronary artery disease and stroke. It is an agent for growth and body development. It protects against cancer, heart disease, degenerative nerve disease, alzheimer's disease

and viral or fungal infections. It provides brain health and blood flow to brain. Roasted or boiled peanuts are more effective as healthy foods.

x) Semolina (Suji)

It is a product of wheat which contains no betacarotene and vit C. The mineral contents are:

Zinc-1.05 mgm/100 gm

Iron-1.6 mgm/100 gm and

Selenium-2.5 microgram/100 gm.

The phenolic content of suji is 138.72 + -4.58 mgm/100 gm and the total antioxidant activity is 0.27 + -0.09 mgm TE/gm. It is a rich source of protein. Semolina boosts intake of several B-complex vitamins especially, folate and thiamin. Semolina is a source of selenium, which prevents heart disease. It also strengthens the immune system and prevents infection.

xi) Puffed Rice

The mineral content per 100 gm of puffed rice are:

Iron-6.6 mgm

Selenium-1.5 microgram

The phenolic content is 56.61 + -3.06 mgm and the total antioxidant activity is 0.49 + -0.11 mgm TE per gm. Puffed rice is a food with a high glycemic index and can raise the levels of insulin and blood glucose considerably.

xii) Rice Flake (Poha)

100 gm of rice flake contains 20 mgm of iron. Poha is a great meal option for diabetics as it promotes slow release of sugar into the blood stream. Intake of poha keeps one full for longer time, a single serving is enough to keep one going without hunger pangs and reach for unhealthy sweets and junk food. Poha is a fat free food and a heart friendly one.

xiii) Milk

Milk is an essential item for every vegetarian diet. 100 gm of cow milk contains:

Betacarotene-53 microgram

Vit C-2 mgm

Vit E-0.041 mgm

Iron-0.2 mgm

The phenolic acid contents of milk are chlorogenic acid, vanillic acid, gallic acid, caffeic acid, and rosmarinic acid, consequently the total phenolic acid content is 577.12 mgm GAE/100 gm. The total flavonoid content is 12.5 microgram/gm, and the total antioxidant activity is (Alyaquobi *et al.*, 2014) 567.17 mgm TE per 100 gm. The health benefits of milk include increased bone strength, smoother skin, stronger immune system, prevention of illness like hypertension, dental decay, dehydration, respiratory problems, obesity, osteoporosis and for some forms of cancer. The health nutrients obtained from milk are essential for human body and help in the prevention of some chronic ailments.

xiv) Curd

It is a product of milk which is superior to milk in some cases. So, curd has been included as an item for the daily diet. One hundred gm of curd contains:

Betacarotene-2.47 microgram

Vit C-0.5 mgm

Iron-0.1 mgm

Selenium-2.2 microgram

The total phenolic content of curd is 2.1 mgm GAE/100 gm and the total flavonoid content is 1.5 mgm of QE per 100 ml, while the total antioxidant activity is (Adak *et al.*, 2013) 0.28 + -0.030 to 0.71 + -0.0268 millimol TE/l. Benefits of curd are numerous some of which are: it fulfills the calcium and Vit D requirements, makes bones and teeth healthy and strong. It makes skeletal system strong and manages normal blood pressure. It keeps digestive system healthy and improves immunity. It prevents ulcer and vaginal infections, reduces risk of viral and allergic disorder as well as it can lower the blood cholesterol level. It can cure brain problem and help in the weight loss.

xv) Tea

Tea contains no vitamin or mineral, but, it has some refreshing component so I have included tea in my diet to overcome fatigue. The phenolic components of tea are gallic acid, caffeic acid and ferullic acid. The total phenolic acid content is (Kopjar *et al.*, 2015) 1.139 + -0.064 to 0.575 + -0.049 mgm/gm. The flavonoid contents are catechin, epicatechin, epicatechin gallate, epigallocatechin, gallotol, quercetin, Kaempferol, myricetin flavones, epigenin and luteolin, making the total flavonoid content as 326 + -0.017 to 0.220 + -0.022 mgm/gm. The total antioxidant activity of tea is 12.241 + -0.36 to 11.930 + -0.434 micromol/100 gm.

Health benefits of drinking tea are awesome. It helps to lower cholesterol, prevents blindness, and reduces cortisol level. It is anti-inflammatory and increases memory, focus and concentration. It is helpful for reducing allergy and risk of stroke. It also reduces the risk of dementia. People drinking tea are found to improve overall health.

CONCLUSION

In proposing a dietary model, care should be taken so that people following the diet chart can get the supply of necessary macronutrients and micronutrients essential for keeping themselves active and healthy. These have been discussed in my earlier works. The next motive of any model should be to provide as much medical benefits as can be achieved from the above, which has been studied in some detail in the present article.

I have keenly studied the presence of phytonutrients in my proposed diet and come to the conclusion that the above have tremendous health and medical benefits. Persons enjoying this diet will have safeguard against serious diseases like cancer, diabetes, heart disease, etc.

The mental disease, which in the present age, is a severe problem for so many people, can also be regulated upon using the prescribed diet chart. It can help bearing a normal, disease free, antiaging life. The presence of relevant vitamins, minerals, phenolic acids, flavonoids and antioxidants in almost every item of the diet are responsible for all the medical benefits discussed in my article. The exact amount of the above in a day's intake of food can be discussed in detail elsewhere with the consequent effect on human being.

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