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ANTIOXIDANT ACTIVITY OF A VEGETARIAN DIET

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Antioxidants play a crucial role in our bearing a smooth disease free life. They also provide health benefits. The purpose of this article is to investigate the antioxidant activity of a vegetarian diet which has been found to be successful in other aspects. The estimation of antioxidant activity is found to be interesting for people following my diet since it supplies the necessary ingredients of the antioxidant activity. I have evaluated the amount of relevant vitamins, minerals and enzymes in each of the elements in my diet and added them up to get the net antioxidant activity and compared them with the required amounts and tabulated their health benefits. From the estimation of the above I have shown the daily supply of them from my diet in consideration. The result shows that people following my diet get sufficient antioxidants to lead a disease free life.

Keywords: Antioxidant activity, Free radicals, Vitamins, Enzymes, Disease

INTRODUCTION

In furtherance of my model for vegetarian diet (Niyogi, 2015), in addition to studies (Niyogi, 2015; Niyogi, 2016; and Niyogi, 2017) made earlier, an investigation has been carried on the total antioxidant activity obtainable from the above model, consequently the effectiveness of the same.

Antioxidants play important role in maintaining good health of human being and prevent diseases from attacking them. The human body produces antioxidants and free radicals in a natural way. While the antioxidants inhibit the production of free radicals, the free radicals cause damage to the body cells. Incidentally, in most cases, in our body the production of free radicals is higher than that of antioxidants. So, in order to maintain a balance, external supply of antioxidants is necessary.

The external supply of antioxidants come from the fruits and vegetables we eat in our daily diet. An antioxidant molecule inhibits, the oxidation of other molecules which give rise to free radicals. These free radicals, if left unnoticed,

may damage body cells. The antioxidant molecules benefit the body by removing the free radicals from blood. Thus benefits of antioxidants are very important in relation to good health, because if the body contains unchallenged free radicals, they can cause cell damage and wide range of illnesses and chronic diseases (Axe, [xxxx](#)).

Antioxidants give protection against heart disease, eye problems, memory problem, mood disorder and immunity problems. So excess supply of antioxidants from external sources is essential for optimum health since the body can't keep up with the antioxidant production. Primarily, we have three types of antioxidants occurring in nature viz. phytochemicals, enzymes and vitamins (Art. Neutrex). The role of phytonutrients has been discussed in some detail in my earlier work. The most powerful antioxidants are obtainable from plants because the plants are exposed to ultraviolet light throughout the day. They have natural built in protection system that prevents the free radicals, generated from plants, from causing cell damage which would cause the plants withering and dying.

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The enzymes are antioxidants which can be obtained from proteins and minerals we eat in our daily diet. These enzymes are synthesized in the human body (Ananya Mondal, 2017) and can be cited as superoxide dismutase, glutathione peroxidase, glutathione reductase and catalases. The antioxidant enzymes provide optimum antioxidant activity through co-factors like iron, copper, selenium, magnesium and zinc. The quality of the protein sources have impact on the quality of antioxidant enzyme. Some of the vitamins like A, C, E, folic acid and betacarotene are antioxidants. The human body can't produce antioxidant vitamins naturally, so it is necessary to include dietary sources of them in our daily intake of food (Super Foods for Optimum Health).

A keen observation, shows that my proposed diet supplies a sufficient amount of antioxidant vitamins along with phytochemicals and enzymes.

In this article, I have studied in detail the availability of selenium, lipoic acid, glutathione, co-enzyme Q-10, vitamins A, C and E which provide antioxidant activity (Mercola, 1997) obtainable from prescribed diet.

MATERIALS AND METHOD

To judge the merits of any dietary model, one has to be careful enough to see that the model in consideration can supply the necessary ingredients like energy, protein, fibre, etc., as well as, vitamins, minerals, phytonutrients and antioxidants to mention some of essential components. The vegetarian diet prescribed by me has been successful to supply the energy, etc. The model in question contains a wide variety of elements like: 1) Legume, 2) Vegetables, 3) Fruits, 4) Rice, 5) Wheat Flour, 6) Nuts, 7) Suji (semolina), 8) Puffed Rice, 9) Milk and milk product like curd, and 10) Tea. In selecting elements, care has been taken so that the components are within reach of Poor people. So for legume, I have selected chickpea, green gram and black gram whole.

In the dahl variety, I have chosen redgram and lentil. Dry pea, black eyed bean, soya bean, and kidneybean have also found place in my diet. Large variety of vegetables has been considered so that some or all of them are available anywhere.

The leafy vegetables in consideration are spinach, amaranthus and moringa leaf, while for root vegetables, I have chosen carrot, colocasia, radish and potato. The other regular vegetables, which are easily available, are brinjal, pumkin, tomato, papaya and mushroom.

It is now the turn of the fruits for proper choice. Here again attention has been given so that the fruits in choice are easily available and within reach of poor and middle class family. Some costly fruit like apple has been selected but alternative to same has also been considered.

Thus the fruits in my diet are Guava, Banana, Mango and Apple. The main food items like rice (Parboiled Rice), wheat (wheat flour), semolina, puffed rice, rice-flake, and peanut have been chosen in my diet. Milk is essential for every vegetarian diet, so it and its byproduct like curd which is some-times superior to milk have been included in my diet.

Thus the choice of food items in the diet is completed. But in daily diet there should be some refreshing item to overcome the fatigue of hard labor. The easily available item for the same is tea. So tea has been chosen in the diet even though it contains no vitamin or mineral.

Once the choice of food items of my vegetarian diet is complete, it is now necessary to estimate the antioxidant components. It is essential for the people following the diet for their good health and protection from diseases.

Here I have evaluated the amount of relevant vitamins, minerals and enzymes in each of the items in my diet and added them up in appropriate proportion to get the net antioxidant activity (Vijaykumar and Raghunath, 2009; Ayub Ali *et al.*, 2010; and Sand and Jaganthan, 2013).

A comparison of the above with the required amounts has been presented in tabular form. The table also contains the health benefits (Top 15 Benefits of Vitamin A and C; Health Benefits of Lipoic Acid; Oz and Joe Rogan, 2015; Axe, 2015; and Axe, 2016) of the vitamins, minerals, and other components of antioxidants. It may be mentioned here that all the items above are not chosen at a time for every day diet, but there are various options for choice depending on the availability and cost involved.

Automatically, there is a range in the content of antioxidant activity. Moreover, the data presented here are from raw materials of the items of the diet. Actually, the diet is prepared after proper cooking so there could be some variation in the result. But care has been taken to make the variation in data minimal.

All the above has been discussed in more detail in my earlier works.

RESULTS

In the present article, I have exhibited the antioxidants

Table 1: The Antioxidant Components and their Health Benefits from my Diet Model

1	2	3	4
Antioxidant component	Daily amount from the diet	Daily amount required	Health benefits
1. Vitamin A	450 microgram to 770 microgram	400 microgram to 960 microgram	Prevents macular degeneration and night blindness, cancer and heart disease. Improves health of bones and teeth. Strengthens immune system and aids in reducing risk of urinary stone.
2. Vitamin C	48 milligram to 297 milligram	50 milligram to 80 milligram	Helps to prevent scurvy, reduces risk of cardiovascular disease. Helps to reduce symptoms of asthma. Controls diabetes and protects against cough and common cold.
3. Vitamin E	1.17 milligram to 8.77 milligram	8 milligram to 10 milligram	Prevents cancer, cardiovascular diseases, improves metabolism and aids in reducing and delaying growth of cataracts.
4. Selenium	140 to 152 microgram	70 to 400 microgram	Defends against cancer, oxidative stress, lowers chance of heart disease, kashan beck disease, boosts immunity, and regulates thyroid function.
5. Lipoic acid	90 to 96.2 milligram	50 milligram to 100 milligram for antioxidant purpose.	Reduces oxidative stress in the body, blood pressure and insulin resistance, improves diabetic neuropathy and removes toxic metals from the body.
6. Glutathione	100 milligram to 111.32 milligram	13 milligram to 109.9 milligram	Enhances brain health and cognitive function. Reduces toxicity. Improves kidney health, immunity function and supports deep restful sleeps.
7. Co-enzyme Q-10	2.90 milligram to 5.05 milligram	3 milligram to 5 milligram from food	Benefits the heart, increases energy, fights aging, helps with high blood pressure. Co Q-10 have been shown to correlate with congestive heart failure.

obtainable from each item of the daily diet and added them up to get the net effects. Since there are alternative options for the food items there are ranges of the antioxidants available from daily diet chart.

The antioxidants studied here come from vitamins A,C and E, enzymes like glutathione, co-enzyme Q-10 in presence of iron, copper, selenium and zinc. Magnesium is found here to have little effect so it has been dropped out from my investigation. The effect of iron and zinc has been studied

in my earlier investigation, so in this paper effect of selenium alone (as far as minerals are concerned) has been taken into account.

The result of my investigation has been presented in Table 1.

DISCUSSION

From Table 1, it can be found that my prescription for daily diet provides the necessary amount of antioxidant activity

from Vitamin A, C and E, selenium, lipoic acid, glutathione, and co-enzyme Q-10 (from comparison of column 2 and 3 in the table (Daily Intake of Selenium; Daily Intake of Lipoic Acid; and Flagg *et al.*, 1994). It is further evident that benefits obtained from the above components safeguard against cancer, heart disease, blood pressure, diabetes, dementia, aging and help to bear an active and peaceful life.

Careful evaluation of the capacity of total antioxidant activity from the intake of my prescribed diet is found to be 14000 to 17000 micromol TE/day while the daily required amount per day is 8000 to 11000 micromol TE.

Graphical representation of the results in Table 1 are shown in the three dimensional pi-diagrams where Figure 1 gives the lower limit of the components of antioxidants discussed here, while Figure 2 gives the upper limit of the above. Daily requirements of components of antioxidants are shown with minimum values in Figure 3 and maximum values in Figure 4.

Figure 1: Lower Limit of the Components of the Antioxidants

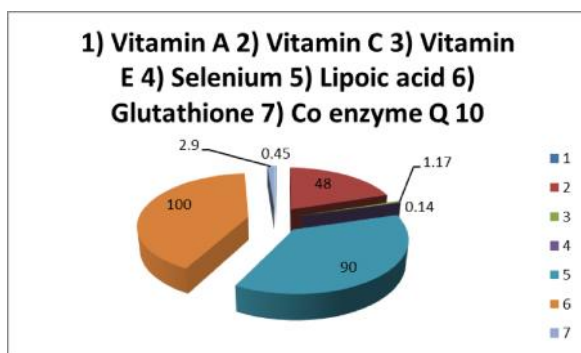


Figure 2: Upper Limit of the Components of the Antioxidants

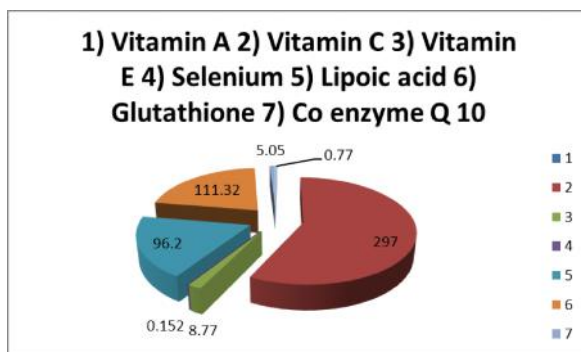


Figure 3: Lower Limit of the Daily Requirement of the Components of the Antioxidants

1) Vitamin A 2) Vitamin C 3) Vitamin E
4) Selenium 5) Lipoic acid 6) Glutathione 7) Co enzyme Q 10

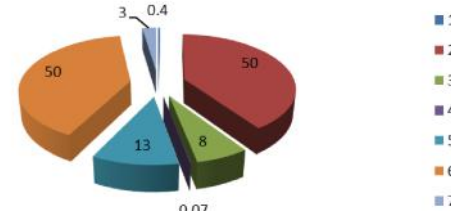
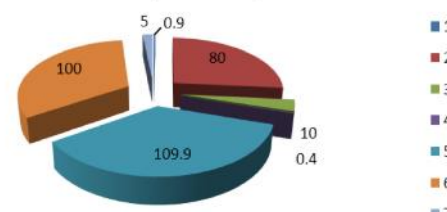


Figure 4: Upper Limit of the Daily Requirement of the Components of Antioxidants

1) Vitamin A 2) Vitamin C 3) Vitamin E
4) Selenium 5) Lipoic acid 6) Glutathione 7) Co enzyme Q 10



DISCUSSION

Antioxidants are key factors in choice of a diet since they give support to a disease free life. People are suspicious about the sufficiency of vegetarian diet regarding the matter. But my investigation shows that the proposed diet, even though a vegetarian one, successfully matches the required antioxidant elements. Thus the dietary model investigated here will have an attractive position in the subject. Hence, it could be concluded that the proposed model of diet discussed here is in a successful situation in the above area. Further investigation of its applicability towards various diseases could be interesting ones and will be presented elsewhere.

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