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Research Article

ANTIOXIDANTS: SAVIORS AGAINST MENTAL DISEASES

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A R T I C L E I N F O

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A B S T R A C T

Objective: Mental diseases are spreading gravely over the world which attract attention of the intellectuals.
So, scientists and doctors are searching incessantly how to avoid the diseases. One way for the same is to see whether by a proper choice of the daily diet the desired goal can be reached.
The purpose of this work is to estimate the amount of antioxidant supply from a daily diet because it is known that antioxidants are powerful weapons against free radicals and oxidative stress in the brain which are the root cause of so many mental(psychiatric) diseases.
Actually, high dose of antioxidants are prescribed for some of the psychiatric diseases.
Method: In the estimation of antioxidants in a proposed diet, the quantities of vitamin A, C, E , lipoic acid, and inositol etc in each item of the diet have been evaluated and added up to get the daily supply of the antioxidants. The amount of antioxidants thus obtained have been compared with daily intake amount necessary to safeguard against so many mental diseases.
Results: The estimation of the antioxidants from the proposed diet shows that it successfully matches with the daily intake amount required to prevent some of the mental diseases. However, a comparison of the above with the medicinal doses shows that the former is much less than the latter.
Conclusion: It is concluded from the results of investigation that by proper selection of daily food, so many psychiatric diseases could be safeguarded but when people are attacked with the psychiatric diseases di*et al*one cannot cure the diseases, so in those cases medical treatment is urgent.

INTRODUCTION

Oxidative stress [Mensah.A,2015] has tremendous effects on human life. It can damage cells in body to result in the diseases like cancer, alzimer's disease [Mondal.A,2014]etc. It is a major factor in several mental health disorders [Mensah.A,2016 and Salim.S,2014]. Oxidative stress is actually an imbalance between the reactive oxygen species(ROS) and antioxidant activity in our system. We need oxygen to support our lives. About a quarter of oxygen consumed by us goes to the brain. The presence of oxygen creates free radicals giving rise to oxidative stress.

The brain is highly susceptible to oxidative stress which can cause mental diseases like anxiety disorder, depression, bipolar disorder, autism and schizophrenia. Furthermore oxidative stress can lead to[Hassan.W *et al*, C.P.Design,2016] mental retardation, delirium, hyperactivity, dementia, delusional disorders, disorder related to alcohol, nicotine dependence disorders, and sleep disorders [Tsaluchidu S, CocchiM,TonelloL,*et al*,2008,oxidative stress in psychiatric disorder, BMC Psychiatry,17,1-3]. It has been found that antioxidants are powerful weapons against free radicals and oxidative stress.

They eat up free radicals and combat oxidative stress. The common antioxidants for the purpose are Vitamin A, C, E , Inositol, N-acetylcysteine, Lipoic acid, Co-enzyme Q10, Quercetine and Betaine. Thus antioxidants play crucial role in maintaining good mental health by inhibiting oxidative stress which arise out of free radicals.

The human body produces antioxidants and free radicals in a natural way. Actually, 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 [Niyogi.M,2018]. In this article, attention has been drawn to find the amount of antioxidants available from a diet proposed earlier[Niyogi.M,2015] in relation to the mental diseases like anxiety disorder, depression, bipolar disorder, schizophrenia and mental fatigue.

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MATERIALS AND METHODS

The diet in consideration involves variety of foods which contain legume, vegetables, cereal, dairy products, fruits and refreshing items. Estimation of the relevant antioxidants from each element of the diet have been calculated and added up to get the net result. The result so obtained has been compared with the daily intake amount necessary as precautionary measure against the diseases mentioned earlier and the medicinal doses essential for treatment of the patients already affected with the diseases.

RESULTS AND DISCUSSIONS

Before presenting the amount of antioxidant available from the diet proposed, it may be interesting to discuss how the antioxidants take part in the brain function. Table-1 below summarises the antioxidants supply and their brain functions.

Table 1 The antioxidants and their functions to protect the brain [Nootropics Expert, Tomen. D, 2018]

Antioxidants	(1) Corresponding brain function
Vitamin A	Vitamin A is a fat soluble vitamin and a potent antioxidant. It is of two forms: preformed Vitamin A(retinol, retinyl ester) which comes from meat, poultry, fish and dairy product, pro-formed Vitamin A (carotenoids, beta-carotene) is obtainable from fruits and vegetables. In our brain , Vitamin A is involved in long term potentiation which affects memory formation and long term depression which affect mood . As Vitamin A is fat soluble our body can store excess amount of it and the level can accumulate. Excess preformed Vitamin A can be toxic but excess proformed vitamin does not pose any problem. Too much Vitamin A can cause memory disruption and depression while too little Vitamin A may cause dementia and Alzheimer's disease. We require Vitamin A for optimal brain health.
Vitamin C (L-ascorbic acid)	It is a water soluble nutrient and electron donor which is very important for healthy brain. Our brain contains more Vitamin C than any other organ in the body. Lack of this vitamin results in cognitive impairment at any age. Vitamin C is a powerful antioxidant and ROS scavenger. It participates in recycling of other brain antioxidant including Vitamin E. Vitamin C is involved in neuronal signaling transmission. It is also involved in presynaptic reuptake of glutamate and prevents potential neuron damage from excess glutamate at NMDA receptors. Supplementing with Vitamin C improves mood, lowers anxiety, reduces fatigue and helps combat depression. Vitamin C includes the expression of BDNF(Brain Derived Neurotropic Factor) . It contributes to myelin formation and brain cell membrane assembly.

(1)	(2)
Vitamin E	Vitamin E is fat soluble and found in plants, some oils, fruits and wheat germ. It includes eight chain breaking antioxidants: four tocoferols and four tocotrienols: alpha, beta ,gamma and delta. All forms of E play roles in brain health. The meta analysis found that cognitive impairment is lowest in those with highest levels of tocoferols and tocotrienols. Vitamin E protects cells from damage associated with oxidative stress caused by free radicals. High blood levels of Vitamin E have been associated with better cognitive performance. Choice of right Vitamin E is important because using a supplement with only alpha-tocopherol interferes with the absorption of other forms of Vitamin E including tocopherols and tocotrienols needed for cognitive health. One serious side effect of Vitamin E is the increased risk of bleeding in the brain. It is to be noted that synthetic Vitamin E supplements are useless for body and brain. So we have to look for Vitamin E supplement from food source with all 8 isomers.

(1)	(2)
Inositol(Vitamin B8)	Inositol is a sugar alcohol and isomer of glucose found in nearly all animals and plants, even though it cannot be considered as a "true vitamin" for it can be made by the human body. Actually inositol is a powerful antioxidant [Samsuddin A.K.M,2018]. Actually inositol is used in the brain as a "secondary messenger". It facilitates communication between brain cells. Thus all our neurotransmitters need inositol to relay messeges. Inisitol can be used to treat panic attacks and anxiety, depression, OCD, bulimia, depression in bipolar disorder and mood change. Inositol helps boost serotonin and dopamine receptor density. It improves the effectiveness of major neurotransmitters in the brain boosting alertness, concentration, focus motivation and memory.
N-acetyl cysteine(NAC)	N-acetylcysteine is the N-acetyl derivative of the naturally occurring amino acid L-cysteine and works by helping restore the body's natural antioxidant glutathione. It is a powerful antioxidant which can boost mood, lower anxiety, improve memory and reduce compulsive behavior. NAC helps neuroprotection and neurotransmitters. It reduces irritability, anxiety and depression. NAC increases our body's antioxidant capacity and balances excitatory and inhibitory neurotransmitters in the brain resulting in less anxiety and depression.

(1)	(2)
Lipoic Acid	Alpha LipoicAcid(ALA) is naturally found in the body which declines with age. So we need to supplement with ALA to achieve the levels our body needs to run optimally. Lipoic acid is unique among other antioxidants because it is both water and fat soluble. Lipoic acid is available in small amounts from spinach, collard greens, tomato and broccoli. Its ability to work in all cell environment lipoic acid can neutralize free radicals. Lipoic acid can navigate cells through out the body so it can easily cross the blood-brain barrier. ALA has powerful protective benefits against cognitive and neurological diseases like Alzheimer's, Parkinson's diseases and depression. It protects neurons by neutralizing the damaging effects of oxidative stress. It reduces brain damage after stroke. ALA has been found to boost acetylcholine, thus improving cognition and memory. It helps neurotransmitters. ALA regenerates depleted antioxidants like Vitamins C, E and glutathione and recycles Co-Q10. Thus it helps brain energy by boosting cellular energy and memory.

(1)	(2)
Co-enzyme Q10(CoQ10)	CoQ10 is a natural antioxidant which is used by every cell. It is the source of cell's energy. It fuels our mitochondria by taking fat and other substances and converting them into usable energy. The mitochondria are like little power plants inside each cell. Brain cells have a higher concentration of mitochondria than most other cells in the body. The source of life and death for neurons lies in mitochondria. Being a powerful antioxidant it helps protect our cells from free radical damage. Thus it protects our brain cells, brain energy and neurotransmitters. CoQ10 fuels mitochondria in neurons which keeps them function optimally for normal brain processing.

(1)	(2)
Quercetin[Self Hacked Life extension Magazine](Enders.M ,2014 Quercetin's Unique Protective Mechanisms, Life extension mechanism)	Quercetina is a powerful antioxidant that may protect brain cells from oxidative stress. It protects the brain from toxicity associated with D galactose. This protection is associated with quercetin's ability to increase SOD activity of malondialdehyde (MDA). It inhibits the pro-inflammatory molecules that are associated with many progressive brain disorders. Quercetin found in apples and onions has been shown to preserve mitochondria in the brain. Quercetin has been found to activate brain's powerful natural antioxidant defense system that upgrades cellular defenses such as glutathione and

	prevents brain cell death. As a neuroprotectiveagent, it protects brain cells against excitotoxicity, the damage done by repeated excitatory electrical impulses observed in Alzheimer's and other neurodegenerative diseases.
Betaine[Gleb,2017](Gleb, Betaine as a nootropic ,2017)	Betaine was first found in sugar beets. It helps the brain by methylation which involves the passing of a methyl group from one molecule to another. It donates its methyl groups to homocysteine creating methionine which is used to help synthesize SAMe, a compound that donates its own methyl groups to help synthesize several neurotransmitters like serotonin and dopamine. SAMe also helps support the brain's antioxidant defenses. Elevated homocysteine levels has been suggested to play a role in depression alzheimer's and other mental disorders. By helping keep the homocysteine level in check, betaine can help the brain from such condition.

From the above table it may be concluded that the antioxidants presented there have tremendous effects on the brain. They save the brain from oxidative stress thereby protecting it from various mental diseases. Having discussed the role of antioxidants for various psychiatric diseases, it may now be tempting to evaluate the amount of antioxidants from the proposed diet [Niyogi.M,2015 and 2018].

Compare them with daily intake amount [Chadha.R and Mathur.P,2015, Science Direct Topics, Marcia Zimerman.C.N,Tomen.D,2016, Report of Linus Pauling Institute, Oregon state University, AMPK Activation, Activator.Net, Ray.S,2016] which are necessary as precautionary amount needed to avoid the diseases. We have also presented the medicinal doses [Gautam.M *et al*, 2012; Levine.J, 1997; Chengappa.K.N, *et al*, 2000; Fritzen.F.M *et al*, 2014; Pereira. C *et al*, 2018; Vidovic.B *et al*, 2014; Nootropic Expert; Terry.C, Live in the now; Maguire.A *et al*, 2018; Foster. P.B *et al*, 2015; Examine.com; Pathak.L *et al*, 2013; Kevina.L.T.C *et al*, 2011;Treato.com; Joshua.J,2012; Lewis.C, 2017; Google Pocket Book, 2005] of the antioxidants when people are affected with mental diseases.

Our observation and estimation of the antioxidants are summarized in Table-2 below.

Table 2 Estimation of antioxidants for psychiatric diseases

(1)	(2)	(3)	(4)
Antioxidants	Daily amount from proposed diet in mg	Daily amount required in mg	Medicinal doses in mg/day
Vitamin A	.45 to .77	.4 to .96	600 for depression
Vitamin C	48 to 297	50 to 80	1000-for depression; 500- for schizophrenia
Vitamin E	1.17 to 8.77	8 to 10	800- for depression ; 1000- for schizophrenia
Inositol	570-1240	1000 to 2000	12000- for bipolar depression and schizophrenia; 18000- for OCD and anxiety
N-acetyl Cysteine	631 to 1036	600 to 1200	2000- for mania, depression, bipolar depression and schizophrenia; 600 to 2400 for OCD; 1200 to 2400 for tricothilo mania; 900 to 2700 for autism
Lipoic acid	90 to 96	50 to 100	200-300 for mental fatigue; 2 to 600 for cognitive function; 500 for schizophrenia; 600 to 1800 for bipolar disorder
Coenzyme Q10	2.90 to 5.05	30 to 100	400-depression; 800 for bipolar disorder; 100 for autism and 100-200 forchronic fatigue
Quercetin	12 to 15	5 to 40	1000 for mental fatigue; 1200 for bipolar disorder; 3000 for schizophrenia and 500 to 1000 for cognitive disorder
Betaine	170 to 318	100 to 200	40-60 for depression; 2000 for schizophrenia

From Table-2 it is evident that the antioxidants available from the proposed diet matches quite successfully with the daily required intake amount as precautionary doses for mental diseases like depression, fatigue, bipolar disease, schizophrenia and autism etc. However, the amount of Co-enzyme Q10 obtainable per day from the prescribed diet lacks severly from the daily required amount. Incidentally, no diet can supply the daily required amount of Q10. This indicates that as far as Q-10 is concerned the di*et al*one cannot help successfully in cases of psychiatric diseases. So to avoid mental diseases due to Q10 deficiency other sources of the same are necessary.

The medicinal doses of the antioxidants when one is affected with psychiatric diseases are found to be much higher than the daily intake amount from the diet, as well as, the daily required amount. This supports the common belief[Niyogi M, 2018]that when somebody is affected with the brain diseases food habits alone cannot remedy the diseases and medicines are essential and one needs help of the doctors.

The interesting observation for inositol is found that medicinal doses for bipolar depression , schizophrenia, OCD, anxiety etc are much lower than the amount of the same obtained from the proposed diet and the daily required amount. So, when people are following the diet prescribed they have little chance to be affected with the above diseases for lack of inositol. The results of Table-2, column (ii) and (iii) are depicted in pi charts of figure 1 through 4

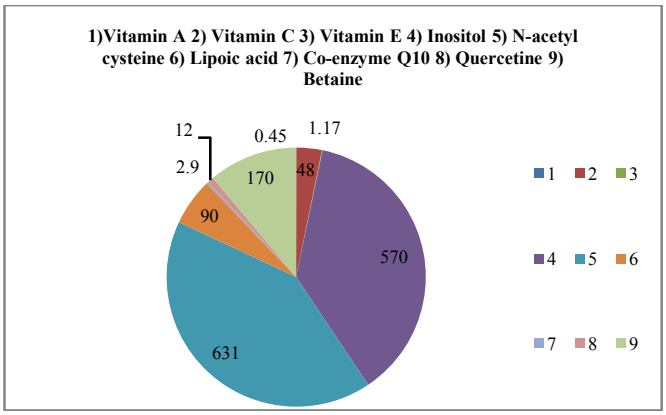

Fig 1 Lower limit of daily amount of antioxidants from my proposed diet in mg

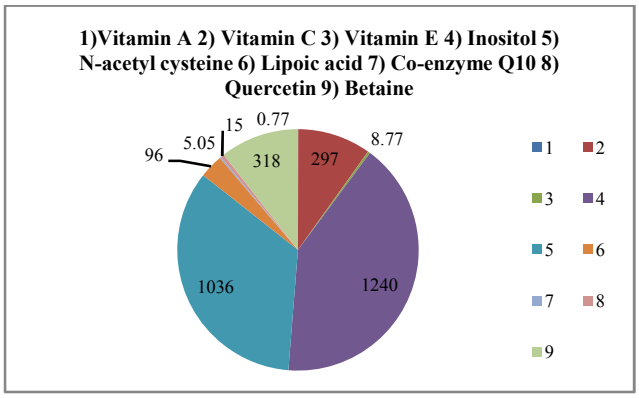

Fig 2 Upper limit of daily amount of antioxidants from my proposed diet in mg

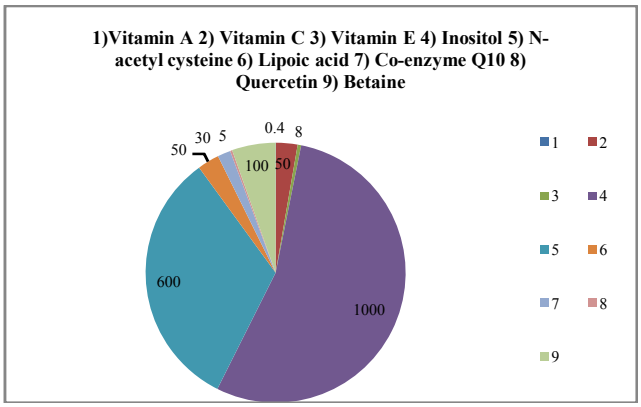

Fig 3 lower limit of antioxidants as daily required in mg

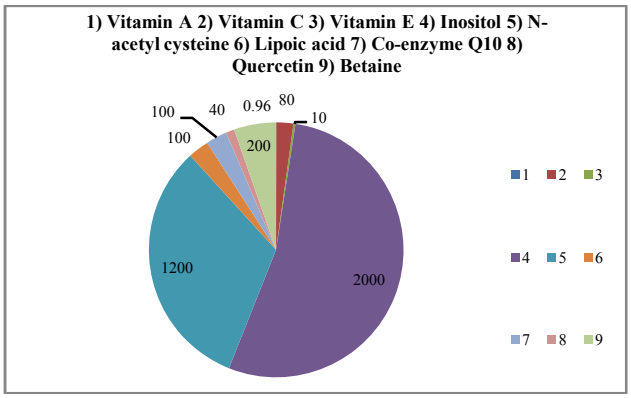

Fig 4 Upper limit of antioxidants as daily required in mg

Here, Fig-1 represents the minimum amounts of antioxidants obtainable from the suggested diet, while Fig-2 represents the maximum amounts of the same from the proposed diet.

Fig-3 gives the minimum amounts of the antioxidants necessary as daily intake and Fig-4 represents the maximum amounts of the same as daily intake amounts. These figures help in a quick glance of various amounts of antioxidants from the proposed diet and daily intake amounts required.

CONCLUSION

Psychiatric diseases are spreading gravely throughout the world so it is a matter of great concern[Geneva Report 2001, Iyer M. WHO Report 2017, Kamath V. Nimhans Studies, 2016 and Mc Phillips DUS, Data Editor, 2016].

Consequently researchers are engaged to find the remedies for the above diseases. Other ways of research are to investigate how to avoid the mental diseases. Antioxidants in our daily food play important role to that end. By proper selection of food we could supply the daily intake amount of antioxidants which could prevent the psychiatric diseases from attacking us. From the investigation carried over here, it is concluded that by proper choice of a vegetarian diet , it is possible to avoid various psychiatric diseases occurring due to lack of antioxidants.

However, when someone is attacked with the diseases food habits alone cannot supply the medicinal doses of the antioxidants. In those cases, medicines are necessary since the medicinal doses of the antioxidants for treatment of the diseases contain higher amounts of the same.

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References

Chadha.R and Mathur.P, Nutrition a Lifecycle approach, 2015, Orient Blackswan Pvt. Ltd.

Chengappa.K.N *et al*, Inositol as an add-on treatment for bipolar depression, 2000, Western Psychiatric Institute and Clinic, University of Pitsburg School of Medicine,2, 47-55

Coenzyme Q10- Scientific Review on usage, dosage and side effect, Examine.com

Coenzyme Q-10, Linus Pauling Institute, Oregon State University

Cystadane (betaine anhydrous) dose, Google Book 2005

Foster P.B, Antidepressant effects of open label Treatment with coenzyme Q-10 for geriatric bipolar depression, 2015, Clinpsychopharmacol, 5(3), 338-340

Fritzen .F.M *et al*, N-Acetyl- cysteine for the treatment of OCD, 2014, Curr. Psychiatry Reviews, 10(4)

Gautam.M *et al*, Role of antioxidants in generalized anxiety disorder and depression, 2012, *Indian J.Psychiatry*, 54(3), 244-247

Gleb, Betaine as a nootropic, 2017

Hassan.W *et al*, Association of oxidative stress with psychiatric disorders, 2016, Curr. Pharmaceutical design, 22000-000

Joshua .J *et al*, The effect of Quercetin supplementation on cognitive functioning in a community sample: a randomized, placebo controlled Trial, 2012, Ther. Adv. Psychopharmacol, 2(4), 131-138

Kevin A. LTC *et al*, Effects of 6 Weeks of Quercetin supplementation on Energy, Fatigue and sleep in ROTC cadets, 2011, Military Medicine, 176, 5-565

Levine J. , Controlled trial of inositol in Psychiatry, 1997, Eur. Neuropsychopharmacol, 7(2), 147-155

Lewis. C, Enterommunology: A guide to the prevention and Treatment of chronic…… , 2017, Google Book

Maguire Aine *et al*, The impact of coenzyme Q10 on the Cognitive Deficits and Symptoms of Schizophrenia: Protocol and Baseline Data of a randomized Placebo-Controlled-Study, 2018, Scizphr Bull 44(Suppl): S357

Marcia Zimmerman, Nutrition Express

Mensah.A, The role of oxidative stress in mental health disorder, 2015, Dr. Mensah's Blog

Mensah .A, What is oxidative stress?....., 2016, Dr. Mensah's Blog

Mondal.A, What is oxidative stress, 2014, http:// www.news-medical.net
Niyogi. M, Well planned Vegetarian diet with MSM, 2015, AJFN, 5(2), 30-35
Niyogi.M, Antioxidant activity of a Vegetarian diet, 2018, IJFANS,7,2, 90-94
Pathak.L *et al*, Natural Polyphenols in the management of major depression, 2013, Expert opininvestig Drugs, 22(7), 863-80
Pereira.C *et al*, Mitochondrial Agents for Bipolar Disorder, 2018, *Int. J. Neuropsychopharmacol*, 21(6), 550-569
Quercetin Bipolar dose, Treato.com
Quercetin AMPK activation, 2016, Activator.Net
Ray.S, Betaine Supplement, 2016
Salim .S, oxidative stress and psychological disorders, 2014, curr. neuropharmacol, 12(2), 140-147
Samsuddin.A.K.M, 2018, Google Book
Terry. C, Live in the Now, Co Q-10 may help you beat chronic depression
Tomen. D, alphalipoic acid, 2016, Nootropic Expert
Tomen .D, Top 40 awesome nootropic blogs that really know their stuff, 2018, Best Nootropics (updated) and Blackburn Distribution
Tsaluchidu.S *et al*, Fatty acids and oxidative stress in psychiatric disorders, 2008, B.M.C. Psychiatry, 17, 1-3
Scientifically proven health benefits of Quercetin, 2018, Self hacked
Vidovic. B *et al*, Effect of alpha lipoic acid Supplementation on oxidative stress makers and antioxidative defense in patients with Schizophrenia, 2014, Psychiatric Danub, 26(3), 205-13

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