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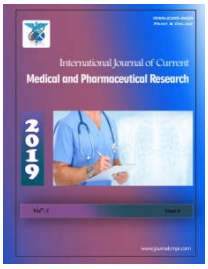

RELATIONSHIP BETWEEN DIET AND EMOTIONAL VULNERABILITY

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ABSTRACT

This article aims at understanding the effects of consumption of specific foods on individual's emotional status. It also reviews the facts mentioned in classical Ayurvedic texts regarding diet and its effects on individual's mind; thus ultimately on emotional stability and resulting physical fitness as evidenced by research. As very well established diet plays a critical role in influencing individual's mental health to a great extent, most of the times by altering the body pH; this article aids in explaining the science behind resulting emotional solidity or volatility after specific diet consumption.

INTRODUCTION

Aptly it's said; 'Mind management is Life management'. The basic prerequisite for a healthy body is a stable mind which can be attained by indulging in healthy lifestyle. And the foundation of a healthy lifestyle is a nourishing, wholesome diet; which many people fail to understand. Hence this is an attempt to bring forth the science behind the facts about diet and its evident effects on emotional well being; emphasizing the saying; '*Yatha anna tatha mana*' which means that mental state is also reflected by the food we eat and this has been precisely penned down in previous eras.

Hippocrates was the first to suggest the healing power of food; however, it was not until the medieval ages that food was considered as a tool to modify temperament and frame of mind, although scientific methods as we know them today were not in use at the time (Prasad C., 1998). Today nutrition and dietetics is looked upon as a science which is implemented in cure of many metabolic disorders like cancer, diabetes, cardio-vascular disorders and other systems' ailments. Most of us rarely relate the role of diet and nutrition for maintenance of mental health and resulting animal behavior. Only recently have we realized the potential of certain dietary nutrients and supplements (macronutrients, antioxidant vitamins, and minerals) in the control of bodily functions, including mental performance (Zeisel SH, 1986). This is supported by the fact that in the Western world alone, contemporary interest in maintaining and enhancing both body and mind through diet and dietary supplementation has generated a multibillion dollar industry (Prasad C., 1998). However, the use of diet to enhance mental function is not a recent phenomenon. In ancient India, *Ayurvedacharya Charak* has already established the rules of dietary consumption in order to maintain and enhance health and psychological state. The concept that food can help or hinder health was also known and used by physician priests at the time of Aesculapius and centuries before (Cosman MP, 1983).

Now it is well recognized that psychological and somatic maladies are invariably interlinked with each other. Most of the body disorders can be well averted by achieving a higher state of consciousness and a healthy mental state and vise-a-versa. In India, Ayurveda strongly advocates Mental Health Care for keeping sound mental hygiene and thus a sound body. Certain dietary compositions are responsible for disturbing homeostasis of mind. An uncontrolled mind goes astray and provokes temporary lasting untruly destructive activities (N. Srikanth, 2018).

Role of nutrition in healthy mind is one of the most undervalued concepts in psychiatry. Brain requires different amounts of complex carbohydrates, essential fatty acids, amino acids, vitamins, minerals and water to remain healthy. There are vast number of factors influencing human brain, mind and ultimately behavior; diet is one of them. In order to reduce emotional outbursts, a keen attention has to be paid to what one consumes. It is evidently said that one of the reasons behind experiencing emotional outbursts is shift in blood pH towards acidic side (Limaye A, 2016).

Relationship Between Diet and Blood pH

Maintaining a stable blood pH is one of the most important homeostatic duties of body in living creatures. All cells require

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pH of bodily fluids to be maintained around 7.4 (slightly alkaline) in order to continue their optimal functions. Renal and respiratory systems are the two main operating systems in this field. The action of renal system, which operates by controlling the excretion of H* through urine, is slow but profound indeed. In contrary, the respiratory system's performance (through controlling CO2 excretion) is quicker but more superficial (Farnam A., 2014). Acid is produced during most of the biochemical reactions occurring in the body. Under normal circumstances, clearance matches with the production of acid. But there are certain foods which end up lowering the body pH than normal for a temporary period but the adverse effect it produces on emotional state lasts for a considerable period as evidenced by researches. Nutritional psychiatry is a new branch which renders insights about gut-brain axis. Gut is considered as a second brain due to intrinsic neuronal networks. The age old medical system, Ayurveda elaborated the same concepts of body-mind relationship eons before (Srikanth N., 2018).

Ideally for pH homeostasis, a normal individual should consume a diet which exerts 60% alkaline and 40% acidic effect; while a patient should consume a diet which exerts 80% alkaline and 20% acidic effect with some exceptions. Certain habits such as alcohol consumption, smoking, tobacco chewing, excessive consumption of tea, coffee, fizzy drinks (coke etc.), late night sleeping and emotional stress result in mild acidosis (Limaye A, 2016). Research also shows that diets rich in animal protein and cereal grains and deficient in vegetables and fruits may cause low-grade metabolic acidosis, which may impact exercise and emotional and physical health (Hietayala E. M. *et al*., 2015).

From a wholesome diet we obtain certain alkaline minerals like calcium, magnesium, iron, potassium, sodium, boron and zinc. We also get certain acidic minerals like chlorine, bromine, fluorine, sulphur, phosphorous, iodine and silicon. All these minerals aid the systems to function promptly only when consumed in optimum proportions (Schwalfenberg G. K., 2011). Research shows that calcium in the form of phosphates and carbonates represents a large reservoir of base in our body. In response to an acid load such as the modern diet these salts are released into the systemic circulation to bring about pH homeostasis [Frassetto L *et al*, 2001]. It has been estimated that the quantity of calcium lost in the urine with the modern diet over time could be as high as almost 480gm over 20 years or almost half the skeletal mass of calcium [Fenton TR *et al*, 2008]. This creates an acidic environment in cells; resulting in anaerobic bacterial growth and concurrent infections. Since enzymatic, immunologic and repair mechanisms function well in alkaline medium, the diet resulted mild acidosis is also responsible for chronic fatigue syndrome and further resultant emotional vulnerability.

Researches also show that polished rice renders more acidic effect than unpolished rice or brown rice. Refined wheat flour is more acid producing than whole wheat; thus over consumption of foods prepared from refined wheat flour results in mild acidosis in body which is disease inviting. *Jowar, bajra, ragi* are alkalizing millets; their consumption is desirable in everyday life. These millets if consumed along with leafy vegetables produce more beneficial alkalizing effect on the system (Limaye A, 2016). Most of the oils are mild acidic; but certain oils with more content of omega 6 fatty acids than omega 3 fatty acids, may exert undesirable effect on emotional stability. Research shows that excessive consumption of arachidonic acid which can be synthesized from omega 6 fatty acids, promotes changes in brain that can disturb mood (Beezhold and Johnston, 2012). Omega 3 containing fats and oils like fish liver oil, flaxseed oil, mustard oil, rice bran oil, olive oil and peanut oil are better than sunflower oil, safflower oil with respect to maintaining arterial pH.

In milk and milk products, cow's fresh milk, curd, buttermilk, fresh cream, clarified butter (*ghee*) and butter all exert neutral pH effect and hence can be used moderately. At the same time cottage cheese (*paneer*) and ripened cheese are extremely acidic. Their daily consumption is not recommended. Ancient wisdom Ayurveda suggests daily consumption of cow's milk with pure organic turmeric and dried ginger powder (*soonth*) aids in prevention from Alzheimer's disease, diabetes and hypercholesterolemia. Metal complexes of curcumin have greater significance in view of the pathology of Alzheimer's disease, where it has been found that due to its lipophilic nature, curcumin can cross the blood brain barrier and chelate metal ions that are toxic to the neurons. It has also been observed that the incidence of Alzheimer's disease is significantly reduced among people that are known to regularly consume turmeric in their diet. [Priyadarshini, 2014]. Non vegetarian foods which are excellent protein sources exert highly acidic effects on the arterial pH as compared to vegetarian proteins like lentils and pulses. Research also says that preserved and canned non vegetarian foods are far more acidic than fresh ones. Also certain herbs and spices which have been advised to be used while preparing non vegetarian foods, like ginger, garlic, curry leaves, coriander, mint, cloves, cinnamon, pepper, coriander seeds, cumin seeds etc and coconut as well exert alkaline effect on the body. In case of lentils, sprouting helps in alkalizing the pH and when consumed along with above mentioned herbs and spices, the net result is desirable alkaline pH (Limaye A, 2016).

All fruits except cranberries, plums and peaches produce alkaline effect on the blood pH. All vegetables including leafy vegetables, wheat grass and barley sprouts also render desirable alkaline effect. Chlorophyll from dark green leafy vegetables aids in pH balancing (Gopi *et al*, 2014). Many of the medicinal properties of the chlorophyll can be attributed because of its alkaline nature. Consumption of chlorophyll rich foods helps in balancing the acid-alkali ratio in the body. The central metal atom magnesium present in chlorophyll is a highly alkaline mineral. By maintaining the appropriate alkalinity and oxygen levels of the body, chlorophyll prevents development of thriving environment for the growth of pathogens. Magnesium also helps the body in maintaining a proper cardiovascular health, functioning of kidney, muscles, liver and brain [Kohler *et al*, 1938].

It might seem that citrus fruits would have an acidifying effect on the body but the citric acid they contain actually has an alkalinizing effect in the system. It should be noted that a food's acid or alkaline forming tendency in the body has nothing to do with the actual pH of the food itself. For example, lemons are very acidic; however the end products they produce after digestion and assimilation are very alkaline. Therefore, lemons are considered as alkaline forming. Likewise, meat will test alkaline before digestion, but it leaves very acidic residue in the body. Therefore, like nearly all animal products, meat is categorized as very acidic forming.

Likewise fresh sugarcane juice is alkaline and its quality is enhanced by addition of lemon and ginger in it. Also organic jaggery and non sulphurated molasses exhibit alkaline effects on blood pH. On the other hand, as aptly said; 'a white poison', table sugar is highly acidic. HFCS (high fructose corn syrup) as well is extremely acidic in nature. Honey is mildly acidic. All artificial sweeteners exert acidic effect except natural organic sweetener 'stevia' which has alkaline properties (Gioffre D., 2016).

All dry fruits especially walnuts, cashews and peanuts except almonds exhibit extreme acidic response in the body. And hence cashews, peanuts etc can be used in accordance with leafy vegetables for alkaline results.

To trim down the extreme acidic effect of coffee, cinnamon powder can be used while preparing coffee. Similarly ginger, lemon grass, mint, basil etc lessen the acidic effects of tea. Although not more than 2 cups of tea/ coffee are desirable in a day. Also 3 liters of pure water daily also aids in maintaining acid-base balance of the body. By replacing water with cold/fizzy drinks like Coca-Cola, Thumbs-up, Pepsi etc. aid in disturbing pH homeostasis. Concluding a meal by a glass of buttermilk daily creates a very soothing and pH balancing effect in the body (Limaye A, 2016).

Another element of consideration is the excess of sodium in the diet. There is evidence that in healthy humans the increased sodium in the diet can predict the degree of hyperchloremic metabolic acidosis when consuming a net acid producing diet [Frassetto *et al*, 2007]. As well, there is evidence that there are adverse effects of sodium chloride in the aging population. A high sodium diet will exacerbate disuse-induced bone and muscle loss during immobilization by increasing bone resorption and protein wasting [Frings *et al*, 2011]. Excess dietary sodium has been shown to result in hypertension and osteoporosis in women [Cappuccio *et al*, 1999, Devine *et al* 1995]. Sodium is an alkaline mineral which should be obtained from diet and excessive external sodium consumption in the form of table salt (NACl) is not desirable.

Two minerals come under limelight when considering emotional stability; Magnesium and Boron. Both are alkaline in nature and aid in pH homeostasis. Magnesium is found in ample amounts in foods like *jowar*, *ragi*, samo rice, brown rice, moth beans, black eyed beans, almonds, turmeric, coconut, garden cress seeds, coriander seeds, ginger, pink radish, leafy vegetables, mango, banana and betel leaf. Betel leaf is the richest source of Mg and Ayurveda advises regular consumption of betel leaf after meals. Similarly Boron is found in high amounts in almonds, sultanas, dates, honey, fresh chick peas etc. Boron plays an important role in improving brain function (Devirian and Volpe, 2003). Therefore these food ingredients should be included in diet regularly.

Diet Induced Acidosis and Disturbed Homeostasis

Disturbed homeostasis and acidosis result in diabetes, hypertension, cancer, Alzheimer, renal stones, arthritis and other auto immune diseases. Research shows that in cases of Alzheimer-type dementia (ATD), Down's syndrome, Huntington's disease, and Pick's disease, low pH and high lactate levels were observed. Low metabolic pH results in decreased levels of pyruvate dehydrogenase enzyme and results in neuronal loss (Yates *et al* 1990). Another research results suggest that pH below 6.6 significantly alters synaptosomal regulatory properties of dopamine (Patrick and Rendel, 1980). Acidosis in brain results in respiratory and other metabolic disturbances (Seifter J.L. and Chang H.Y., 2016). Respiratory disturbances due to acidosis are directly related to psychic apparatus, especially its "emotional" compartment. One research shows that in chronic hyper-excited states such as anxiety disorders, irritability, agitation and depression, respiratory pH disturbance could be one of the main causing factors of confusion and perplexity (Farnam A., 2014). There is some evidence that some cancer cells and tumors grow well in an acidic environment in the laboratory (Fenton and Huang, 2015). Provided here are only few research results; but they provide with the smoking gun needed to highlight the appalling effects of diet induced low grade acidosis with mental and emotional vulnerability.

Role of Diet in Mental Health: Ayurvedic Aspect

Since *Vedic* era, food has been given the prime importance. Three categories of *Ahara* (diet) are described in *Bhagvad Geeta;* are *Sattvika, Rajasika and Tamasika. Sattvika* persons prefer foods which increase life span, are nourishing, keep body healthy, provide satiety, satisfaction, which are pleasing and nutrient rich, provide stability and conductive for heart and soul. Those who consume foods which are very pungent, sour, salty, spicy, excessively dry, which cause burning sensation and foods which are disease producing are *Rajasika* persons and thus these foods are categorized as *Rajasika* foods. Stale foods, unhygienic foods or foods which are not nourishing, foul smelling and adulterated foods come under *Tamasika* foods and people who consume these foods are considered as *Tamasika*. Regular consumption of *Rajasika* and *Tamasika* foods cause some sorts of psychic disturbances (Srikanth N., 2018).

Also Ayurveda describes a unique concept of *Viruddha aahara* (dietetic incompatibility) which is now emerging as a new branch called as 'topography' which needs a meticulous research. The etiological factors for almost all the psychic conditions enlist *Viruddha aahara* as a major cause.

Concluding Remarks

In spite of great achievement in the science of psychiatry, for decades the problems with management of certain mental problems like anxiety, stress etc. have remained not fully addressed with safe and effective solutions. In addition to this, anti-psychotic medication is also creating considerable amounts of discomfort to the patients. At this juncture there is a need for exposition and adaption of such therapies that could effectively tackle such conditions without any adverse events. As described above, changes in the diet can significantly contribute to the emotional calmness and stability. Thus it's the need of time to conduct advanced research to pay heed to the effects of diet on an individual's emotional vulnerability.

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