ACTA SCIENTIFIC NUTRITIONAL HEALTH (ISSN:2582-1423)

Volume 5 Issue 3 March 2021

Research Article

The Emergence of COVID-19: Is it a Proof of Historical Nutritional Neglect?

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Received: January 13, 2021

Published: February 12, 2021

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Abstract

It is strange for many but I have to quote Shakespeare for a soft reminder to ourselves, what Nutrition entails in the lives of human which stands true since times of Aristotle. Marching against nature and siding with "Artificialism" is hallmark of today. One classical example is of natural orange extracts which are used everywhere from cosmetics to paints but for our diet only remains the artificial orange flavors. Where the nature is and where it must be, we quote:

'This fortress built by Nature for herself against infection and hand of war' (The Tragedy of King Richard II, Act II, Scene I, lines 43 and 44, William Shakespeare).

Figure

Keywords: COVID-19; SARS-CoV-2; Nutrition

We are at dawn of third decade of 21st century and a tsunami of COVID-19 has taken over the entire world since last years!! This is the third time a Virus from same family SARS- (CoV-2) threatened human life and led to historical global locked down and we are still without clue of what will work against this deadly virus. There is no weapon in our arsenal to sure fire. Coronavirus disease (COVID-19) which is an infectious disease caused by a newly discovered coronavirus namely severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Most people infected with the COVID-19 virus experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with medical problems like cardiovascular disease, diabetes, chronic re-

spiratory disease, and cancer have a higher risk to develop serious illness. At the moment, the vaccines or treatments for COVID-19 is nonexistent. Although, many ongoing clinical trials are under way in search of effective treatments.

Since there is a lot of hustle bustle if we do have an evidence or none from nutrition research to treat COVID-19. Let us take a look at this conundrum and do a reality check. This is well documented that poor nutrition is a key driver and risk factor for disease. Similarly, it is also well established scientific truth that nutritional deficiencies cause impairment of immune function and thus increase vulnerability to all sorts of infections. As a result, infection also affects the normal body metabolism and status of several nutrients in human body. This brings us an adverse scenario and a vicious circle of under nutrition, compromised immune function and creates an ideal environment for microbial growth and infections. There is logical conclusion from these facts that optimal nutrition is the key for the prevention of many infections surely including viral such as COVID-19. We know little whether a good nutrition status can shield us against COVID-19 because covid-19 is new form of virus even different than the SARS and MERS for which no vaccine is yet available. In fact, in case of SARS and MERS we developed a natural immunity and as a result, the outbreak has almost lost its vigor and capacity to infect us with same pathogenicity. Here, one can definitely question that, was it nutrition which shielded us against CoV-2 and MERS. A reasonable analysis from epidemiological statistics since 2002, it proved again that optimal nutrition might have played a significant role to provide a barrier or did herd immunity came into play and halted race of further spread of these viral outbreaks. It may be through the mechanism of strengthening the immunogenicity.

The human immunogenicity comes into play by activation of two general systems: innate (natural) immunity and adaptive (specific, acquired) immunity.

- Natural/Innate or Non-Specific defense system (Immunogenicity) includes external physical barricades e.g. such as skin, mucous membrane and Internal Defenses e.g. Phagocytes, antimicrobial proteins, soluble factors which provide an immediate first line of defense against invading microorganisms.
- Specific or acquires or adaptive defense system (immunogenicity) consists of Lymphocytes such as B-Cell (formation of antibodies), T-Cell and Natural killer (NK)-Cells. This is further divided into Humoral mediated immunity: response by lymphocytes like B-Cell (formation of antibodies) and Cell mediated immunity: response by lymphocytes like T-Cell and Natural killer (NK)-Cells. In T-Cells, there are types like Th (helper) Cells, T (Memory) cells, T (effector) cells. These T cells are more specific players towards the fight against COVID-19 that is being fought at natural/Nutritional or Pharmaceutical front.

Nutritional factors can modify the characteristics of both host and infectious agent. An organism's response to nutritional influences is condition by such innate host features as genetic makeup, age and physiologic state, and by presence of complicating illness. A variety of published evidence demonstrated conclusively that protein malnutrition when sufficiently severe and prolonged, had a profound effect on resistance to infections. The direct effect of malnutrition on host resistance is well documented. Dietary inadequacies have long been assumed to diminish resistance to infection by reducing the integrity of various tissues. Nutrient deficiencies frequently result in gross epithelial lesions. Examples are the metaplastic hyperkeratosis due to Vitamin A deficiency, the dermatitis, cheilosis, and angular stomatitis from riboflavinosis and pyridoxine deficiency; the characteristic dermatosis and mucosal atrophy of pellagra; the spongy gums and subcutaneous hemorrhages of scurvy; and the atrophy of skin and gastrointestinal mucosa of severe protein deficiency. The mucosa of gastro-intestinal tract of vitamin-A-deficient cotton rats was more readily penetrated by poliovirus than the mucosa of control animals by weaver in 1946.

The outcome of a potential interaction between malnutrition and infection depends in part on innate host factors, such as age and genotype, and in part on abnormal physiologic states, metabolic disorders and acquired immunity. Interaction also depends on the genetic constitution of infection agent. If the agent is uniformly highly virulent or the uniformly avirulent the effect of the diet may be minimal. In the same way the innate resistance of the host may be so slight or so great that diet is of secondary importance. When Schneider Model (1950) further explained by Dr. Scrimshah and fellows, It seems that diet should then influence the severity of infectious disease in nearly 50% of case. Schneider 1950 used three (3) genotypes (Selected resistant, Selected susceptibility, Unselected strains of mice) and three (3) different cultures of salmonella (Virulent, uniformly avirulent and Mixed).Nutrient excess may have either an adverse on reproduction or pathogenicity of infectious agent. Both infectious and nutritional diseases are dynamic and changing in characteristics and frequency as the conditions causing them to change. In the ecologically balanced populations characteristically present in nature, the situation is an intermediate level of both virulence of agent and resistance of host, with the result that diet often determines the outcomes, dietary factors thus have greater significance in nature and in public health than some laboratory experiments suggest.

Recent studies involving Nutritionists, Virologists and Immunologists have reported unanimous evidence which strongly supports associations of low levels or intakes of micronutrients such as vitamins A, E, B6 and B12, Zn and Se adverse clinical outcomes during viral infections and proposed that vitamins B, vitamin C, omega-3 polyunsaturated fatty acids, selenium, zinc and iron should be considered in the assessment of micronutrients in COVID-19 patients besides vitamins A and D (ESPEN). The Academy of Nutrition and Dietetic has stated that nutrients play a role in the immune system and can be found in a variety of foods. Focus on Balance is the main narrative. To help keep your immune system healthy all year long, focus on a balanced eating plan, adequate sleep and stress management. Similarly, the British Dietetic Association on 24 Mar 2020 stated that there are many nutrients that are involved with the normal functioning of the immune system, so we would encourage maintaining a health balanced diet in order to support immune function (include copper, folate, iron, selenium, zinc and vitamins A, B6, B12, C and D). Malnutrition is a serious condition which can increase a person's risk of infection as well as slowing down their recovery. Those with an infection are also at higher risk of developing malnutrition which slows their recovery. BDA recommends that adults and children over the age of one should take a daily supplement containing 10 micrograms of Vitamin D.

Obesity inhibits both virus-specific CD8+ T cell responses and antibody responses to the seasonal influenza vaccine and obesity-related conditions seem to worsen the effect of COVID-19; indeed, the Centers for Disease Control and Prevention (CDC) reported that people with heart disease and diabetes are at higher risk of COVID-19 complications. Evidence is emerging that suggests that obesity-related conditions seem to worsen the effect of the virus; individuals with heart disease and diabetes are at higher risk of COVID-19 complications. The challenge for future virus pandemics is therefore not only to protect those affected by undernutrition, but also the growing number of people living with obesity. This is particularly important for the WHO European Region as in many European countries obesity and overweight affects 30-70% of the population.

(WOF)

As a qualified public health and nutrition researchers, we intended to share the best possible evidence. Honestly speaking, it is found that many have reviewed the research work of immunology and physiology scientists since 1918 (which have been reviewed elsewhere), it has been found experts agree on the protective role of Proteins, Vitamins and mineral in promoting the resistance against bacteria and viruses. For example, the great nutritionist and Physician of his time, Nevin S. Scrimshah piled up hundreds of studies showing strong linked between nutrition and infections (Viral, Bacterial, Fungal, Protozoal and Helminths). Recently, Susanna Cunningham-Rundles after decades of her extensive research work conclusively stated that "When malnutrition is present, the overall development and expression of the immune response are significantly impaired". Despite this huge efforts by scientists in the field of immunology and Nutrition, much could not be tapped because the nutrition was at the bottom of priority list in the healthcare research. We could not materialize the initial results showing persistent association between Nutrition and infections into well designed clinical trials on human beings though there are tons of experimental animal studies. We failed at global scale to address this. Yes it is truly worded in Lancer 2019 report "It is everyone's and no-one's problem. Nutrition had no dedicated Millennium Development Goal and still has no Sustainable Development Goal (SDG). SDG 2, zero hunger, addresses only one of the many manifestations of poor nutrition. Despite several efforts, actions for improving nutrition have failed to gain global traction".

Discussion and Conclusion

We conclude that moderate to severe nutritional deficiency increase the seriousness of infectious disease in man. Moreover, nutritional factors can modify the characteristics of both host and contagions. A variety of published evidence demonstrated conclusively that protein malnutrition when sufficiently severe and prolonged, had a profound effect on resistance to infections. Dietary inadequacies diminish resistance to infection by reducing the integrity of various tissues. The immunity is precisely a system, not a single entity. To function well, it requires balance and harmony. There are many nutrients that are involved with the normal functioning of the immune system and therefore eating a variety of healthy foods each day in order to support immune function is a prudent strategy. Preserving nutritional status and preventing or treating malnutrition also importantly has the potential to reduce complications and negative outcomes in patients at nutritional risk who might incur in COVID-19 in the future. Immaturation of T cells due malnutrition or thymic atrophy due to aging mechanism, one thing is established that there is a strong relationship between nutrition and immunity in the elderly. For example, deficiencies of

zinc, selenium, iron, copper, folic acid, and vitamins A, B6, C, and E alter immune responses in animals, and the effect of similar deficiencies on the human immune response has yet to be assessed. That is catch and should lead us to do clinical trials in human beings urgently. An ignored agenda of human nutrition clinical trials can be a window of opportunity that one find in the backdrop of COVID-19. SUSANNA CUNNINGHAM (2001) reported that new assay methods have enabled the design of experiments addressing different stages involved in immune-cell activation and the study of effects on signaling pathways, which may then lead to the characterization of causal relationships. Most investigations begin with a general assessment of how a nutrient or altered nutritional state affects the general parameters of the immune system, immune-cell subsets and function. Measurement of changes in frequency and number of circulating lymphocyte subpopulations in the course of observation or dietary intervention is now accepted as a useful and widely comparable procedure, but attention must be given to the issue of controls. For human studies, a complete blood count and differential are needed to quantify effects on absolute numbers of cells. Although there is frequently a limitation on blood to be drawn for nutritional studies, it is essential that the baseline evaluation includes parallel studies providing a complete blood count, haematological analysis of haemoglobin, haematocrit, etc. [1-10].

The lives of over a billion malnourished people are at stake. There is no quick fix and lets shift focus from panacea of all time medical remedies for communicable and non-communicable illnesses to most robust nutritional strategies. Time to RETHINK and take actionable drastic but sustainable measures including essentially the Syndemic oriented strategy to normalize life on mother planet earth. For this, we must ensure an equal distribution and sufficient supplies of food for all as a fundamental human right at urgent priority. Human Nutritional surveillance should get serious involvement of WHO for not only vulnerable population and groups but inclusive of every human being living on earth. This will eventually, make inroads for a healthful nutrition to come into play to turn around the wheel and save us from COVID-19 and future pandemics alike. Above shared body of nutritional evidence is undoubtedly convertible into a most reliable fighting tools and a sure fire weapon to mitigate this cytokine storm before it re-emerges with more vigor. Stimulate the phagocytes as Dr. Bernard shaw said and my addition to activate the T cells. Stay safe and shelter at home with a good nutritional shield.

The true remedy for all diseases is Nature's remedy. Nature and Science are at one … Nature has provided, in the white corpuscles as you call them – in the phagocytes as we call them – a natural means of devouring and destroying all disease germs. There is at

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