Section A -Research paper

TREATMENT OF IMMUNE RELATED DISEASE: A IMPACTFUL ROLE OF VITAMINS

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ABSTRACT:

Humans have both born and acquired immunity. As multisystem organisms, we have lifelong functions. We're not the only bacteria on Earth; others live nearby. In a way, we're symbiotic with the other microorganism. Sometimes dominant species overrun the human body. Our immune system helps us prevent them. In modern times, nutrients and minerals improve COVID-19 immunity. Wuhan was the source of a 2020 pandemic virus. COVID-19 virus assaults the immune system and activates inflammatory modulators, harming the body. Multivitamins and micronutrients help boost the immune system, according to a scientist and his team. A, B, C, D, K, micro vitamins, zinc, salt, potassium, and calcium play a role in fatal diseases. This review focuses on nutrients' role in immunity and immune-related illnesses.

KEYWORDS: Vitamins, Immunity, Auto-immune diseases, Arthritis and Psoriasis

1. INTRODUCTION:

We became multitasks in the modern world, but at the same time, we started to ignore our health and are still ignoring to restore it to normal as it was in the past by using supplements that are available on the market [1, 2]. In this context, we would like to refresh your memory by naming a few immune-associated disorders, including psoriasis, systemic lupus erythematous, inflammatory bowel diseases, type 1 diabetes, and rheumatoid arthritis. The most relied-upon nutrients for curing immune-related illnesses within the necessary period are diets A and D, out of all the nutrients [3]. Rheumatoid arthritis is an autoimmune condition that mostly affects the joints. It causes inflammation in the joints as a result of joint irritation. Some foods have been investigated as potential arthritis treatments in the past. Vitamins A, C, E, and D were investigated and found to have good efficacy inside the same. Numerous studies have demonstrated the value of this multivitamin treatment for arthritic patients [4]. Vitamin K is important for the development of cartilage structure, while vitamins D and K are crucial for strong bones. On the other hand, psoriasis nutrients aren't the best way to treat psoriasis; there isn't another way to do it without using conventional medicine. These illnesses listed above are thought to affect the older population quite frequently [5, 6].

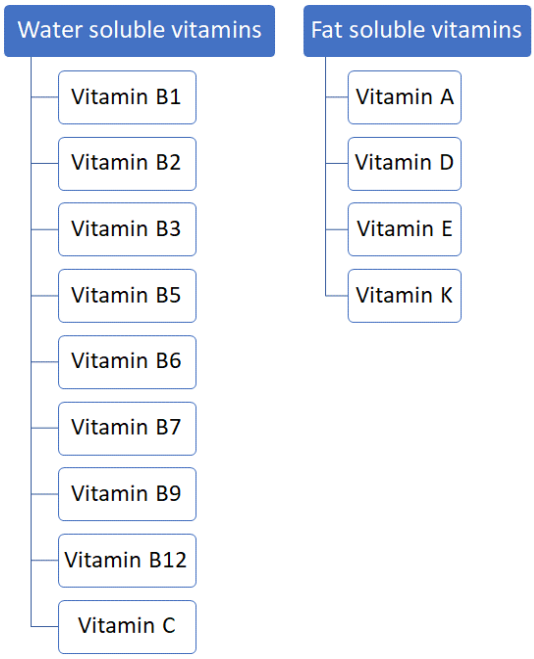

Figure 1: Classification of the fat soluble and water-soluble vitamins (Self-created with software ChemBioDraw Ultra 14.0. PerkinElmer, Waltham, Massachusetts, United States)

2. VITAMINS RICH FOODS FOR THE MANAGEMENT OF IMMUNE SYSTEM RELATED DISEASES:

Table 1 vitamins benefit immune-related disorders, according to the literature. Some are easily available to the public and can greatly help patients with immune system illnesses. Immune system illnesses include Type 1 diabetes, inflammatory bowel disease, SLE, RA, Psoriasis/psoriatic arthritis, MS, Graves' disease, and Addison's disease [7, 8].

Table 1: Specific vitamins have impact on the immune system related diseases or auto-immune diseases and its food source [9-12].

Sr. No.	**Vitamin**	**Food source**	**Disease**
1	Vitamin A	Fish, meat, and dairy products	Psoriasis
2	Vitamin D	Fatty fish, dairy products, orange juice, cereals, beef liver, cheese and egg yolks	Auto-immune diseases example Psoriasis
3	Vitamin E	Sunflower seeds, Almonds, Mango, Avocado and Peanuts	Type 1 diabetes, Rheumatoid arthritis (RA), Psoriasis/psoriatic arthritis, Multiple sclerosis
4	Vitamin K	Green leafy vegetables, Soybean, Smaller amounts in meat, cheese and eggs	Rheumatoid arthritis and Systemic lupus erythematosus
5	Vitamin B1	Peas, fresh fruits, nuts and wholegrain breads	Rheumatoid arthritis and Psoriasis

6	Vitamin B2	Milk and dairy products and dark-green vegetables	Multiple sclerosis and Systemic lupus erythematous
7	Vitamin B3	Whole grains, eggs, milk, nuts and avocados	Cancer and Multiple sclerosis
8	Vitamin B5	Cereals, Mushrooms, Avocado, Nuts, seeds, dairy milk, yogurt, Potatoes, Eggs, Brown rice, Oats, and Broccoli	Lupus and Multiple sclerosis
9	Vitamin B6	Fish, potatoes, vegetables, and fruit	Huntington disease, Lupus and Multiple sclerosis
10	Vitamin B7	Cooked eggs, Salmon, Avocados, Beef liver, Pork, Sweet potato, and Nuts	Multiple sclerosis and Psoriasis
11	Vitamin B9	Dark green leafy vegetables like spinach, Asparagus, broccoli, Beans, Whole grains, Sunflower seeds Peanuts, and Fresh fruits	Cytokine storm and Multiple sclerosis
12	Vitamin B12	Fish, Meat, Milk, Eggs and Cheese	Autoimmune gastritis and Lupus
13	Vitamin C	Citrus fruit, orange, Strawberries, sprouts, broccoli and potatoes.	Systemic lupus erythematous and Multiple sclerosis

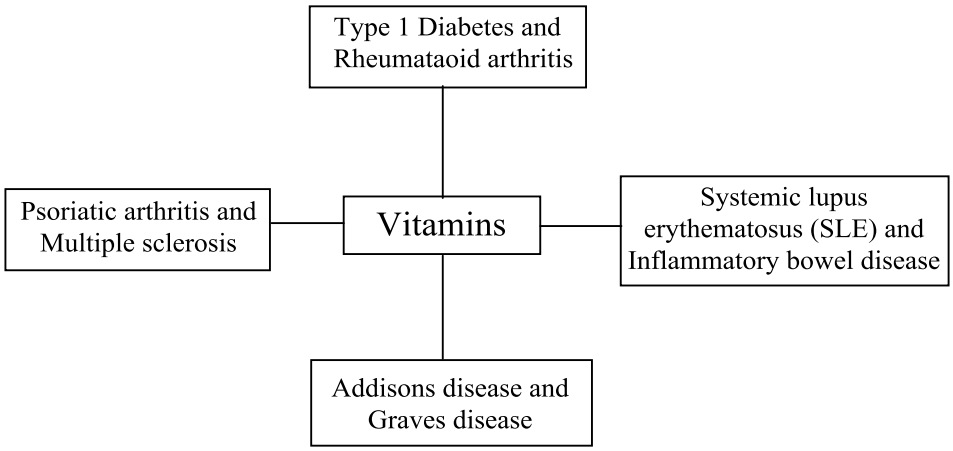

Figure 2: Role of vitamins in the immune system related diseases (Self created with software ChemBioDraw Ultra 14.0. PerkinElmer, Waltham, Massachusetts, United States)

3. FAT SOLUBLE VITAMINS COMMONLY USED IN THE TREATMENT OF THE IMMUNE SYSTEM RELATED DISEASES:

Here are a few fat-soluble nutrients examined for system-related sickness and their effect on the immune system [13, 14].

Vitamin A: Nerve fibre cells, the immune system's microbe-sensing alarms, send a "red alert" to activate immunity or a "calm down" message to tone down excessive response that can harm the host. "Calm down" uses axerophthol, which links vitamin A deficiency and response illnesses. Chronic diseases, such as tuberculosis, viral hepatitis, and HIV, may have found ways to skew this balance of signals in their favour [15]. Nerve fibre cells, the immune system's microbe-sensing indication, send a "red alert" to activate immunity or a "calm down" message to tone down excessive immunity that can damage the host. The "slow down" statement links Vitamin A deficiency to response illnesses. Microorganisms and viruses that cause chronic illnesses, such as tuberculosis, viral hepatitis, and HIV, may have discovered ways to distort this balance. In a mouse model of multiple sclerosis, zymosan and TLR2 prevent white blood cells from attacking worried tissue. Mice are inoculated against myelin, a nerve sheath. Vaccinating mice with zymosan reduced nerve damage [16, 17].

Vitamin D: Vitamin D controls CD4+ T-lymphocyte differentiation, activation, and autoimmune processes. Dendritic cells (DC) are antigen-presenting cells (APC) that initiate and maintain T-cell-based immune responses. In vitro 1, 25(OH)2D3 impairs monocyte development into DC, reducing the number of expert APC to activate T cells. D3 boosts acid phosphatase and oxidative burst. 1, 25(OH)2D3 increases human monocyte, neutrophil, and cell line antimicrobial peptide interest. Defensin and cathelicidin are endogenous antibiotics that kill microbes. Antimicrobial peptide Cathelicidin may destroy intracellular mycobacterium [18]. In addition to neutrophils and macrophages, natural killer cells and respiratory epithelial cells secrete antimicrobial peptides to fight airborne infections. Nutrition D stimulates antimicrobial proteins and UVB rays to produce it. D3 boosts acid phosphatase and oxidative burst. 1, 25(OH)2D3 increases human monocyte, neutrophil, and cell line antimicrobial peptide interest [19, 20]. Defensin and cathelicidin are endogenous antibiotics that kill microbes. Antimicrobial peptide Cathelicidin may destroy intracellular mycobacterium. In addition to neutrophils and macrophages, natural killer cells and respiratory epithelial cells secrete antimicrobial peptides to fight airborne infections. Nutrition D stimulates antimicrobial proteins and UVB rays, which induces its production [21]. The importance of comparing serum vitamin D levels in these patients needs more research, but it could be a future biomarker for assessing disease interest and progression [22]. Vitamin D treatment can reduce or slow the progression of undifferentiated connective tissue disease to a systemic autoimmune disease. We believe that by identifying new immuno-suppressive effects of vitamin D in the local and adaptive immune system, a new use of the nutrient may be developed in future treatment of autoimmune illnesses [23].

Vitamin E: Vitamin E's effect on the immune system may be due to its antioxidant action. Modern research links dietary E deficiency to rheumatic diseases [24]. Numerous studies have been conducted on rheumatologic illnesses, including rheumatoid arthritis (RA), systemic lupus erythematosus (SLE), Sjögren syndrome, Behçet's disorder, celiac disease, inflammatory bowel diseases (IBD), and systemic sclerosis (scleroderma). According to study, dietary E can alter autoimmune diseases [25, 26]. Almost all reviewed publications in the current literature link vitamin E serum levels to autoimmune diseases. According to the research, autoimmune diseases like scleroderma and SLE can be controlled with dietary E. Modern statistics on autoimmune diseases do not specify if vitamin E deficiency causes or

causes them [27, 28]. Therefore, study is needed to determine how vitamin E's popularity affects autoimmunity in every autoimmune illness. Large-scale epidemiological study is also needed. The evidence presented here showed the beneficial effects of vitamin E treatment on autoimmune diseases, particularly inflammatory reactions [29]. Given that vitamin E prevents lipid peroxidation, which contributes to autoimmune disease aetiology, dietary vitamin E consumption may be used to regulate autoimmune diseases and their progression [30].

4. WATER SOLUBLE VITAMINS COMMONLY USED IN THE TREATMENT OF THE IMMUNE SYSTEM RELATED DISEASES:

Vitamin B1: Madden's treatment was based on 259 psoriasis cases. He divided them into small businesses and treated each with a special method, using vitamin B1, vitamin B2, vitamin B entire complex, brewers' yeast, vitamin C, oestrogenic substances, sulphanilamide, bismuth salicylate in oil, anterior pituitary extract, adrenal cortex extract, low-fat diet with vitamin B1, low-fat diet and liver extract, low-fat diet with vitamin B, and anterior pituitary extract. Low-fats diet plus 1,000 global units of vitamin B1 daily by mouth, mixed with an exfoliating ointment gave the satisfactory results, according to the authors. Madden acknowledges that not all cases will respond to this treatment [31]. Oral psoralen and UVA 2 h later cause a favourable phototoxic reaction. Solar lamps emit UV-A. Methotraxate. By blocking DNA synthesis, this cytotoxic folic acid antagonist slows epidermal cell turnover. Methotraxate is administered orally, intramuscularly, or intravenously. RA. In excess, aromatic retinoids are beneficial. Cheilitis, xerosis, face dermatitis, and hair loss are side effects. Teratogenic medication should not be taken during pregnancy. Peritoneal Dialysis and hemodialysis are effective psoriasis treatments but are considered heroic. Dietary supplements are sometimes prescribed by doctors [32, 33]. From October 1937 to October 1939, 121 patients were treated with vitamin D, vitamin B1, vitamin B complex, brewers' yeast, vitamin C, liver extract, diluted hydrochloric acid, estrogenic substance, sulfanilamide, bismuth salicylate, anterior pituitary extract or adrenal cortex extract alone, together, or with a low-fat diet. Only ambulatory patients with medical and microscopic psoriasis were evaluated in the literature. After being assessed, patients began treatment. If a psoriasis treatment was ignored after a certain time. The patient also takes 1,000 units of vitamin B daily. In some cases, the ointment must be reapplied in the morning before heading to the radiation department due to nighttime mobility. In cases of thicker lesions, I add 20 to 30 grains of salicylic acid to tar ointment and recommend removing scales with a stiff brush or pumice stone. After exfoliating, the ointment is reapplied and the radiation treatment is performed [34, 35].

Vitamin B2: Riboflavin, or vitamin B2, is essential to human health. It boosts mice's resistance against bacterial infections. This study evaluated vitamin B2 treatment for inflammatory disorders. Three inflammatory conditions are evaluated. Neutrophil-mediated, T cell/macrophage-independent cutaneous inflammation is one. DTH is a T cell/macrophage-based but neutrophil-independent inflammatory response. 1/3 is collagen-triggered arthritis with additions from above reactions. Throughout the tests, mice received peritoneal vitamin B2 injections. Nutrition B2 mice had a reduced granulocyte response to olive oil. DTH reactivity and collagen II arthritis, however, were not reduced [36, 37]. Any new psoriasis

remedy is viewed with trepidation. In a limited number of cases, a novel form of riboflavin has shown such promise that this report is given. Recent studies on riboflavin's mode of action have warned its usage in scaly skin diseases. B2 deficiency in monkeys can cause scaly dermatitis in humans. This makes one question if maculo- or papulo-squamous eruptions are linked to riboflavin metabolic problems. RA is an inflammatory autoimmune disease. Highly reactive oxygen free radicals may cause the disease. RA patients are subgrouped by rheumatoid factor, disease interest, and disease duration. RA Tracking ROS generation, indicators of lipid peroxidation, protein oxidation, and DNA damage, patients and healthy controls were examined for oxidant-antioxidant status. Antioxidant levels were also evaluated. RA is an inflammatory autoimmune disease. Highly reactive oxygen free radicals may cause the disease. In this study, RA patients were subgrouped by rheumatoid factor, disease severity, and duration. RA Patients and healthy controls were examined for oxidant-antioxidant status by tracking ROS generation, indicators of lipid peroxidation, protein oxidation, and DNA damage [38]. Antioxidant levels were also evaluated. RA patients showed a marked increase in ROS formation, lipid peroxidation, protein oxidation, DNA damage, and reduced antioxidant defence system interest, leading to oxidative stress that can contribute to tissue damage and chronicity of the illness [39].

Vitamin B3: One of the main symptoms of one condition is damage to the medullary sheath (demyelination) (MS). It's interesting to note that every MS and B complex shortage results in severe myeline degradation, which prevents neurological signals from being sent. Vitamin B deficiency has a wide range of indications and symptoms, though common ones include weariness, prolonged aerophilic stress, infection, and demyelination. In particular, cobalamin (cobalamin) has drawn a lot of attention for its role in the methylation process, involvement in myelination and remyelination, and ability to reverse the symptoms of multiple sclerosis (MS) [40, 41].

Vitamin B6: PLP, the active form of vitamin B6, is a co-factor in over 150 enzymatic processes. Plasma PLP is low in inflammatory circumstances; liver PLP is also low, whereas erythrocyte, muscle, and diet B6 indicators show little changes [42]. Plasma PLP predicts the risk of chronic diseases like cardiovascular disease and several malignancies and is inversely associated to several inflammatory markers. Vitamin B6 improves immunological function in B6-deficient humans and animals. Mobilization of vitamin B6 to infection sites could produce immunomodulating metabolites. Vitamin B6 catabolism, kynurenine pathway, sphingosine 1-phosphate metabolism, transculturation pathway, serine and glycine metabolism are relevant inflammatory processes [43].

Vitamin B9: Amyotrophic lateral sclerosis (ALS) is an incurable, progressive neurological disease that affects the motor cortex, spinal cord, and brain stem. ALS's aetiology and pathogenesis are yet unknown. The study of ALS risk factors can help understand the mechanism of this illness's development and, possibly, slow down its growth in sufferers and reduce the risk of its development in people with a familial predisposition [44]. Researchers and doctors are interested in the protective role of vitamins in ALS. Several of them have unclear or disputed positions. This practice examines the role of vitamins as environmental factors impacting ALS risk and motor neuron degeneration [45].

Vitamin B12: 46 patients with multiple sclerosis and 23 patients with other conditions were

studied for serum and CSF vitamin B12 levels. No significant difference between multiple sclerosis and control groups was seen in serum or cerebrospinal fluid vitamin B12 levels or serum:cerebrospinal fluid ratio. Serum and cerebral fluid vitamin B12 levels were correlated, but not protein concentrations. Serum and CSF B12 binding is discussed. Some patients with multiple sclerosis have abnormally low serum vitamin B12 levels [46, 47].

Vitamin C: Epidemiological study links vitamin C (and other antioxidants) to cancer risk. However, preventative mechanisms are no longer studied. Vitamin C (ascorbic acid) has photoprotective and collagen-synthesizing effects on skin [48-51]. Vitamin C counteracts oxidative stress through transcriptional and post-translational pathways; this modulation may also affect redox-sensitive transcription factors, differentiation, cell cycle arrest, and DNA-damage-induced death. All of these vitamin C-mediated reactions are likely important for cell homeostasis. Systemic lupus erythematosus has faulty DNA damage processing (SLE). Vitamin C may influence 8-oxo-2′-deoxyguanosine formation/removal (8-oxodG). SLE serum, urine, and PBMC DNA baseline 8-oxodG levels no longer differ from healthy patients. Compared to healthy people, vitamin C-supplemented SLE patients did not have a reduction in PBMC 8-oxodG or an increase in urine 8-oxodG. SLE patients had a large, albeit mild, increase in serum 8-oxodG compared to healthy participants [52, 53].

CONCLUSION:

Vitamins play a significant role in human nutrition. To produce these vital vitamins that the body needs to eat, humans must consume a well-balanced diet or raw food. We tried to include a comprehensive list of all the significant vitamins in this assessment. Vitamins have a significant effect on the body and are essential for daily life. Until we experience their absence, we are unaware of how important they are. We made an effort to discuss both fat-soluble and water-soluble vitamins in this chapter, as well as how they operate in daily life. We also concentrated on the disorders connected to this issue. We have concentrated on a few immune-related illnesses and how vitamins can be quite helpful in their treatment. For instance, while psoriasis can be treated with medications, people can recover more quickly from the condition if they also take vitamin D and E supplements. The use of vitamins as a nutraceutical in the treatment of many diseases and for the long term management of immune-related ailments has enormous promise.

DECLARATIONS:

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Not applicable.

Consent for publication:

All the authors approved the manuscript for publication.

Availability of data and material:

All required data is available.

Competing interests:

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