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Reflection of Vitamins and Mineral Deficiency in General Health Condition: Article Review

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ABSTRACT

Vitamins are organic substances that humans require in trace amounts. Each plays a distinct part in preserving physical well-being. To increase their supply, some people require supplements; however, this is dependent on their lifestyle and general health. Vitamins are necessary nutrients of the body's healthy growth and operation. Vitamins are divided into two classes: fat and water soluble. Inorganic elements, known as minerals, are derived from food and cannot be produced by the body. Collecting all types of vitamins in a study their sources, functions, excess and deficiency. They have an effective role in the body's metabolism and immunity and in combating most diseases that affect the human body. Balancing them in moderate concentrations in the human body protects against the risk of contracting many diseases that affect adults and children. Therefore, every individual must take adequate food. It contains all types of vitamins, and in case of deficiency, it is compensated with manufactured vitamins.

Keywords- Vitamin, fat Soluble Vitamins, Water Soluble Vitamins, Minerals, Trace Elements.

I. INTRODUCTION

Vitamins are organic substances that humans require in trace amounts. Each plays a distinct part in preserving physical well-being. To increase their supply, some people require supplements; however, this is dependent on their lifestyle and general health. Vitamins are necessary nutrients for the body health growth and operation. Vitamins are divided into two classes: both fat and water soluble (1,2).

II. FUNCTION

Every vitamin on this list serves a vital purpose in the body's. When you do not receive enough of a certain vitamin, you develop a vitamin deficiency. Health issues might arise from vitamin deficiencies (3).A diet low in fruit, vegetable, whole grain, legumes, beans, and fortified dairy product may raise your heart disease, cancer, and osteoporosis, a condition that affects the bones (4).

- Soft tissue, mucous membranes, skin, teeth, and bones can all be formed and maintained with the support of vitamin A.
- Another name for vitamin B6 is pyridoxine. Red blood cell formation and brain function are maintained with the aid of vitamin B6. Additionally, this vitamin is crucial for the proteins that are involved in a variety of bodily chemical events. The more pyridoxine your body needs, the more protein you consume.

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- Vitamin B12 is essential for metabolism, just like the other B vitamins. Along with maintaining the central and peripheral neurological systems, it helps produce new red blood cells.
- Another name for vitamin C is ascorbic acid, which is an antioxidant that promotes healthy teeth and gums. It helps the body maintain its tissues and absorb iron. Additionally, it's essential for wound healing.
- As vitamin D is produced by the body after being exposed to sunlight, it is commonly called the "sunshine vitamin." The majority of people at most latitudes find that three times a week, ten to fifteen minutes of sunshine is sufficient to generate the required amount of vitamin D in the body. It's possible that those who don't live in sunny areas don't get enough vitamin D. Getting adequate vitamin D only from diet is really difficult. The body uses vitamin D to help absorb calcium. Calcium is necessary for the regular growth and upkeep of strong teeth (5).
- Tocopherol is another term to vitamin E, which is an antioxidant. It aids in vitamin K use and red blood cell formation.
- Blood will not coagulate properly without vitamin K, so it is necessary. According to certain research, it's critical for bone health. The synthesis of hormones and cholesterol, as well as the metabolism of proteins and carbohydrates, depend on biotin.
- One B vitamin that supports healthy skin and nerves is niacin. At greater dosages, it also lowers triglycerides.
- Along with vitamin B12, folate aids in the formation of RBC. It is required for the synthesis of DNA, which regulates the growth and function of tissues and cells. It is important for any pregnant woman to make sure she gets adequate folate. Spina bifida is one of the birth abnormalities associated with low folate levels. Folate, in the form of folic acid, is currently added to a lot of meals (6).
- Vitamin B5, or pantothenic acid, is necessary for food metabolism. It also contributes to the synthesis of cholesterol and hormones.

Vitamin B2, riboflavin, interacts with the other B vitamins. It is necessary for red blood cell synthesis and bodily growth.

- Vitamin B1, thiamine, helps the body convert of carbs into energy. It's critical to consume adequate carbohydrates when pregnant and nursing. It is also necessary for heart health and the integrity of nerve cell.
- The nervous system and brain both function normally when choline is present. Liver edema may result from choline deficiency.
- The body uses carnitine to convert fats into energy.

Soluble Vitamins

Vitamins, as previously noted, fall into two categories: fat or water soluble. The body needs the fat-soluble vitamins in large quantities to function properly (5). Numerous medical conditions have been linked to their deficits. The fat soluble vitamins A, E, D, and K have recommended daily allowances (RDAs) 7–10.5 g /Day, and 75–150 g/Day, respectively. Water-soluble vitamins, such as ascorbic acid, pantothenic acid, pyridoxine, thiamin, niacin, biotin, and riboflavin, have recommended daily allowances (RDAs) of 1.0 mg, 1.2 mg, 2.2 mg, 13 mil-equivalents, 150–200 g, 65 g, and 4.5 mg, respectively (6).

Vitamin A

In 1913, vitamin A was discovered to be the first fat-soluble vitamin. The liver is where beta-carotene is transformed into vitamin A. It helps with eyesight in low light and shields the eyes from infections. Low vitamin A levels cause rhodopsin deficiency, which impairs vision in low light (7). Additionally, vitamin A has a role in appropriate cell development and the physiological function of glands and epithelia. The immune system and bone formation are supported by vitamin A. Due to its oil solubility; pre-schoolers are taken retinol palmate every six months. Worldwide, 33% of preschool-aged children suffer from vitamin A insufficiency; in Africa, the prevalence is reported to be 44%. 80,000 people die in Ethiopia each year from vitamin A insufficiency (8). The incidence of vitamin A insufficiency in preschoolers in this nation is reported to be 60%. Vitamin A insufficiency is connected to the subsequent conditions: Deficits in vitamin A can lead to a number of conditions, including growth retardation, intestinal and respiratory infections, keratomalacia (softening of the cornea's thickness), xerophthalmia, follicular hyperkeratosis, and degeneration of the myelin sheaths. Anorexia, vomiting, and nausea can result from a vitamin A overload (9). Vitamin A is utilized by the body for several functions, including immune system development, epithelial tissue growth and maintenance, skin support, maintaining eyesight sharpness in low light. Good sources of vitamin A are green vegetables, various grains and legumes, papaya, pumpkin, fish, meat, yellow vegetables / fruits, papaya, pumpkin, mango and. Additional sources include egg, liver or halibut liver oil, angle liver oils, spinach, cabbage, carrots, and amaranth (10).

Vitamin D

The most widely recognized advantage of vitamin D is its ability to regulate blood calcium and phosphorus levels. There are several versions of this vitamin that are anti-rachitic. At least ten pro-vitamin D are known, and four distinct crystalline D vitamins have been identified. The majority of vitamin D that humans need is either produced after sun exposure or obtained from animal sources (11). Ergosterol is exposed to UV radiation to produce vitamin D2. Natural vitamin D3 is generated in the skin of both humans and animals after exposure to sunshine. It can be found in fish oil. Radiation treatment of 7-dehydrocholesterol may create it. We refer to vitamins D2 and D3 as vitamers. When vitamin D is present, calcium and phosphorus are more easily absorbed from the stomach and deposited in the bones. Foods that are good source of vitamin D3 include liver, cheese, butter, fish liver oil, fortified meals, milk, eggs and margarine (12). Furthermore, appropriate bone mineralization and phosphate tubular reabsorption are

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supported by vitamin D. It also has antioxidants in it. As we age, our skin's capacity to produce vitamin D3 is decrease. After the age of 70, vitamin D levels in humans decline to about 30% of the normal level. In the temperate zone, the availability of UV light is reduced, which limits the productions of vitamin D3 through the skin. In the temperate zone, the availability of UV light is reduced, which limits the production of vitamin D3 through the skin. About 400–800 IU of vitamin D per day appear to be needed in the absence of sun exposure to maintain adequate bone metabolism(13).

Bone development may be impacted by a vitamin D deficiency. A vitamin D shortage in youngsters results in rickets, a condition where the bones weaken and flex under stress. A deficiency of vitamin D3 due to the risk of bone fractures in adults by causing osteomalacia, or soft bones (14).

Vitamin E

An antioxidant found in nature is vitamin E. Vitamin E is known by structurally related names, tocopherols or tocotrienols (15). It contributes to both wound healing and immunity. Wheat milk, germ oil, cereal, pork, almonds, eggs, and a variety of vegetables, especially green leafy vegetables, are good sources of vitamin E. In experimental animals, low vitamin E levels have been linked to testicular degeneration, recurrent miscarriages, and abetalipoproteinemia, a condition in humans that affects how well fat and fat-soluble vitamins are absorbed from meals (16). Furthermore, a deficit in vitamin E may lead to increased anemia and hemolysis of RBC in preterm neonates. Overdosing on vitamin E can result in increased prothrombin time, headaches, fatigue, dizziness, intestinal irritation, and problems using vitamins A and K (17, 18).

Vitamin K

Prothrombin and other vitamin K clotting factors that are dependent, such VII, IX, X, protein S and C, are produced by vitamin K primarily and are necessary for healthy blood coagulation and blood clotting. The liver is where these clotting factors are made. it can be found in liver, cabbage, lettuce, vegetables and egg yolks,. Because of the healthy bacteria flora in our intestine, our body is also able to manufacture its own vitamin K. To prevent Vitamin K deficiency, premature newborns are given 0.5–1.5 mg intramuscularly or 0.5-2.5 mg orally from birth (21). A vitamin K shortage can cause delayed clotting times in adults, hemorrhagic illness in newborns, and widespread bleeding. Overdosing on vitamin K can cause vomiting in adults and hyperbilirubinemia in neonates (22–23).

Water Soluble Vitamins

Thiamine (Vitamin B1)

Water-soluble thiamine, also known as vitamin B1, serves as the coenzyme thiamine pyrophosphate. Carbohydrate metabolism is aided by thiamine pyrophosphate (23). The hexose monophosphate shunt also involves thiamine pyrophosphate. a substance that has neuro-protective properties, as per Ikeda et al. (2016). Nuts, potatoes, meat, beans, and grains all contain thiamine. A beriberi is a disease caused by its lack. Because the vitamin is removed from the seed coat of polished rice, it is frequently observed in communities who eat this type of rice. There are three types of beriberi: wet, dry, and infantile (24). Thiamine is a co-catalyst in the digestion of sugar and is necessary for the healthy operation of the heart, neurons, and muscles. Foods strong in vitamin B1 include wheat germ, unmilled oats, almonds, beef, beets, lentils, potatoes, dried beans, pork, poultry, green peas, beans, eggs, and lush green vegetables (25). Insufficient thiamine can result in Wernicke-Korsakoff syndrome, polyneuritis, mental disorder, ataxia, and beriberi in alcoholics. Overindulgence may result in headaches, tachycardia, or irritable sleep disorder (26).

Riboflavin (Vitamin B2)

Lactoflavin, often known as riboflavin, is a yellow crystalline material. liver, Grain, milk, oats, green, eggs, and vegetables are good sources of riboflavin (17). It contributes to the respiration of tissue. Its derivatives are FAD (flavin adenine dinucleotide in its oxidized state) and FADH2 (flavin adenine dinucleotide in its reduced form). In the electron transport pathway, FADH2 produces two ATP (28). Oxidation-reduction processes include the participation of FAD and FADH2. The TCA cycle yields one FADH2 (29). In the complexes of succinate dehydrogenase and alpha-keto glutarate dehydrogenase, they function as coenzymes. Ariboflavinosis is the disorder caused by its insufficiency. The symptoms of ariboflavinosis include scrotal dermatitis, eye disturbances, glossitis (sparkly red and sensitive tongue), sore lips, textured desquamation of the skins surrounding the mouth (cheilosis),and photophobia (light sensitivity) (3).

Niacin (Vitamin B3)

Although it can be produced by the body from tryptophan, it is necessary for human nutrition (31). Pellagra is the disorder caused by its insufficiency. Meat, yeast extracts, and some cereals contain it. Nicotinamide adenine dinucleotide, or NAD, is the coenzyme that the body produces from niacin. These coenzymes participate in processes involving oxidation and reduction. They participate in the activities of alpha-ketoglutarate dehydrogenase, malate dehydrogenase, and isocitrate dehydrogenase complexes as coenzymes. Niacin can be used to treat diabetes mellitus because it lowers cholesterol (32, 33).

Pantothenic Acid (B5)

It is a member of the vitamin B complex family. As a part of fatty acid synthase and coenzyme A, it takes part in the creation of hormones and energy (34). Individuals lacking in pantothenic acid may experience dermatological problems such as dermatitis and alopecia, as well as enteritis and adrenal insufficiency (35, 36).

Biotin (Vitamin B7)

Another substance regarded as B-complex group is biotin. It facilitates the metabolism of proteins, the

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production of fatty acids, the use of glucose, and the absorption of folic acid and vitamin B12 (27). The consequences of either an excess or a shortage of biotin are still unknown. Green beans, egg yolks, liver, kidneys, and dark green vegetables are sources of it (38).

Folic Acid (Vitamin B9)

Fruits, liver, and green leafy vegetables all contain water-soluble vitamin folate, which is produced as folic acid. Tetrahydrofolate is the term for the kinetic version of vitamin B9, also known as folate, following transformation (29). For the creation of the nucleic acids DNA and RNA, it is a necessary molecule. Due to the potential for neural tube defects, pregnant women should take folate supplements as a preventative precaution. A folate deficiency can also result in megaloblastic anemia, a kind of macrocytic anemia. A vitamin B12 deficiency is the differential diagnosis that results from this, and it can also cause megaloblastic anemia (40). An essential part of DNA, thymidine, is synthesized with the aid of methylenetetrahydrofolate. Offspring whose mothers had low levels of folic acid during their pregnancies are frequently affected by neural tube abnormalities. It is possible to prevent neural tube abnormalities in offspring whose pregnant moms took supplements containing folic acid (41). The process by which homocysteine is converted to the amino acid methionine which is needed for the formation of myelin is mediated by methyl vitamin B12. Tetrahydrofolate is also produced during this process from methyl tetrahydrofolate. The proper production of methyl tetrahydrofolate is contingent upon a sufficient intake of folic acid and vitamin B12. A deficiency in either of them can lead to abnormalities in the gastrointestinal tract, bone marrow (which can cause megaloblastic anemia), and all tissues with a high rate of cellular proliferation (42). When folic acid is given in large doses to a patient who is deficient in vitamin B12, it can reduce anemia but not cure the neurological deficit; in fact, it may make it worse by raising the tissue's requirement for vitamin B12 (43, 44).

Cobalamin (Vitamin B12)

Meat, egg, fish, and dairy products contain cyanocobalamin, often known as water soluble vitamin B12 (45). It is essential for both the bone marrow's and nerve cells' correct development synthesis of red blood cells. Megaloblastic anemia, neurological conditions like ataxia and neuropathy, or neuropsychiatric symptoms like dementia due to myelin degeneration can all result from inadequate vitamin B12 intake. Vegan diets are deficient in vitamin B12 (46). When figuring out what might be causing megaloblastic anemia, it's critical to take folate deficiency into account (37).

Vitamin C

Water dissolves in the crystalline solid form of vitamin C, additionally referred to as ascorbic acid (48). Ascorbic acid is synthesized by most animals and plants; humans and primates, on the other hand, loss gluconolactone oxidase, an enzyme that is necessary for the final step of the production of ascorbate. As a result, these species' daily needs for vitamin C should be met by the food (49).The greatest foods high in vitamin C include beef liver, oranges, lemons, grapefruits, and vegetables. For wound healing and a healthy immunety system, vitamin C is necessary for the process that produces collagen, which fortifies connective tissues. Changes in connective tissue caused by a deficiency in vitamin C cause scurvy, a condition where the created collagen is unstable(50). Scurvy symptoms include bleeding, swollen joints, and soreness in the muscles. Free radical scavenger and antioxidant vitamin C can be used topically to treat a range of skin disorders, including those associated with photoaging. Vitamin C can be used to treat skin hyperpigmentation because it suppresses the activity of melanocytes, the cells that produce melanin (51).

Minerals

Inorganic elements, known as minerals, are derived from food and cannot be produced by the body. By nature, they are present in soil and water. Some are vital to the survival of all living things, while others are incredibly hazardous. Minerals from the environment are largely absorbed by plants, which then pass them on to animals higher up the food chain (52). It is typically lethal to be deficient in such vital elements for nourishment. The body's essential components are minerals. They are necessary for the body's essential biomolecules to assemble and perform. Despite the fact that minerals are not used by the body as an energy source, it does need them to maintain regular metabolic activities. These necessary minerals can be divided into two categories according to what the body requires, These necessary minerals fall into one of two categories: macro or micro trace-minerals (53).

Macro-Minerals

Macroscopic minerals include salt, calcium, phosphorus, magnesium, and potassium, which are all important for nutrition. They are categorized as macronutrients since the typical adult's daily needs (150 mg/Day)(54).

Calcium

It's located in milk, fish, dark green leafy vegetables, and hard water. One mineral that is necessary for healthy growth and bone development is calcium. Blood often contains this mineral (55). For cells to carry out a variety of tasks, an appropriate quantity of calcium is needed. Bones and teeth contain a lot of calcium. It has a role in blood coagulation as well. Bones contain the majority of the calcium. Overall, the extracellular fluid contains around 950 mg of calcium, which is in a state of dynamic equilibrium with the skeleton. The approximately 1% of skeletal calcium (10 g) that is readily exchangeable with calcium in extracellular fluids forms a sizable calcium reserve. The remaining 99.5% of the calcium in the bone is only gradually exchanged. Every day, ≥ 500 mg of calcium are deposited into and removed from the bone as part of an ongoing remodeling process. Bile, pancreatic juice, and intestinal secretion all release calcium into the gut, where it is entirely

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reabsorbed. Bones begin to release calcium when blood calcium levels drop, which raises calcemia (56). Calcium is either deposited in bones or eliminated in urine when blood calcium levels rise. Calcium has a role in blood coagulation, muscle contraction, and neuron function. It is maintained in the blood by calcitonin and parathyroid hormone. One gram of calcium is the daily recommended amount. The body absorbs calcium with the help of vitamin D. Its absence results in osteomalacia, osteoporosis, and rickets. Tetany may result from a blood calcium deficiency. Both long-term renal failure and phosphate therapy can result in hypocalcaemia. An excess of calcium in the blood might lead to kidney stones (57).

Sodium

Dietary deficits are rare because sodium (natrium) is present in most meals. Sodium plays a role in blood regulation. Sodium chloride is the most common form of sodium that is sold as table salt. Urine typically contains 95% of the salt that is lost from the body. The kidneys are the body's main regulators of sodium. Salt excretion in urine increases as dietary intake does. Urine sodium level can completely vanish if insufficient sodium is consumed, if plasma sodium levels drop for any cause (58). This normally occurs as a result of adrenocortical hormone, aldosterone an increasing sodium tube reabsorption in the renal tubules. An increased blood sodium level along with symptoms like oedema, convulsions, weakness, irritability, and lethargy is known as hypernatremia (59).

Magnesium

Hard water, whole grains, almonds, apricots, soybeans, bananas, and green leafy vegetables are excellent suppliers of magnesium. It plays a role in maintaining bone integrity and growth, controlling the cardiac cycle, and facilitating the function of muscles and nerves. Deficits include neuromuscular irritability and hypomagnesemia. Toxicology manifests as hypotension, cardiac issues, and breathing failure. (60, 61).

Potassium

It can be found in beef, bananas, raisins, prunes, whole and skim milk, and other foods. The heart cannot operate normally without a suitable quantity of plasma potassium. Potassium ions are also involved in the skeletal muscle fibers' regular operation (62). Numerous enzyme processes require potassium. Potassium must be present for glycogenesis to occur. When potassium is deposited along with the glycogen that insulin causes to deposit, insulin injection lowers the level of potassium in the plasma. A low plasma potassium level can also result from insulin's increased cellular protein synthesis, which binds potassium ions. Hypokalemia, paralysis, and heart problems are the results of potassium deprivation. Over potassium can cause heart problems, paralysis, and hyperkalemia (63).

Phosphorus

Legumes, nuts, grains, seafood, meat, cheese, and poultry are sources of it. A strictly vegetarian diet may have low levels of bioavailability for minerals like iron and zinc due to the presence of compounds like phytic acid. Furthermore, a high dietary fiber intake may prevent it from being properly absorbed (64). Since humans are omnivores, it is unlikely that they will become deficient in trace elements. Research has indicated that there is no greater incidence of mineral shortages in vegetarians compared to non-vegetarians. In actuality, the specific amount of trace elements that humans require is still unknown (65). Since excessive levels of trace elements might have harmful effects, they should not be utilized as dietary supplements. Phosphorus is necessary for the synthesis of ATP, GTP, UTP, and bone and teeth. It is found in phospholipids, is a part of DNA and RNA, and is a component of cell membranes. Renal failure may result in hyperphosphatemia (66).

Trace Elements

Trace elements are a significant class of minerals, as their name suggests that are needed in trace levels for human metabolism on a daily basis. They are considered trace elements since their daily requirement shouldn't be more than 120 mg, which can be detrimental to health. On the other hand, severe health problems may result from a lack of any of these trace components. Manganese, iron, copper, zinc, and iodine are examples of trace minerals (67).

Iron

Dark meat, kidney, liver, beans, peas, egg yolks, and green leafy vegetables are good sources of iron. Given that it is necessary for life, Among the metals found in the body most frequently is iron(68). It helps the blood carry oxygen to the tissues by forming bonds with myoglobin and hemoglobin. Enzymes involved in oxidation-reduction processes contain iron in the majority of cells. After birth, the body stores a significant amount of iron (245 mg). The mother's prenatal iron consumption has an impact on this iron accumulation. During the last three months of pregnancy, there is the highest requirement for iron (69).

About 25–35 mg of iron per day is needed by the growing fetus in pregnant women. Both haem and non-haem iron can be found in food. Haem is found in meat, fish, poultry, and milk and has a higher bioavailability. Plant products have various amounts of non-haem. Hypochromic microcytic anemia is brought on by an iron deficit. The surgical removal of the upper small intestine, subtotal gastrectomy, persistent infections, achlorhydria and anti-acid medication, an excess of phosphates and oxalates, diarrhea, and malabsorption are factors that decrease iron absorption (7). Anaemia develops when there is insufficient iron intake, blood loss, or an increase in the body's need for iron. Pallor, weakness, irritability, mouth cracks at the angles, heart murmurs, and dyspepsia are a few of the signs. Iron excess is the cause of skin pigmentation, cirrhosis, and hemochromatosis(71).

Chloride

Green olives, cornmeal, potato chips, and animal products all contain chloride. Chloride is needed to make hydrochloric acid and to keep blood's composition intact.

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It controls the osmotic pressure as well as the acid-base equilibrium. The incapacity of neonates to thrive and alkalosis are two examples of deficiencies. Two indicators of toxicity are increased extracellular volume and hypertension (71, 72).

Cobalt

Cobalt is made by microorganisms in the stomach. It contributes to the production of vitamin B12. The body stores 1.5–2.5 milligrams of it. Enough cobalt is stored in the liver as hydroxyl and methyl cobalamine to last four years. Two micrograms are needed each day (73).

Copper

It can be found in whole grains, cereals, nuts, dried legumes, and organ meats. Because the pH of gastric juice is acidic, copper complexes found in food are liberated in the stomach. It has a role in both hematopoiesis and bone development. In the small intestine, it is largely absorbed via diffusion and, in trace amounts, by carriers (74). Copper enters the bloodstream, joins forces with albumin, travels to the liver, and becomes a part of ceruloplasmin, This is thereafter transferred to the additional tissues. Copper excretes in urine, skin, hair, and nails, as well as in faeces and bile. Albumin is the carrier of it (75), and has a ceruloplasmin binding. It is included in certain enzymes, including tyrosinase, catalase, cytochrome oxidase, and ferrooxidase. It is necessary for the synthesis of red blood cells. Proteins that include copper, such as ceruloplasmin, aid in the gastrointestinal tract's ability to absorb iron. Hypochromic anemia can result from a copper deficit. Hepatolenticular degeneration and biliary cirrhosis are two symptoms of copper intoxication (76).

Zinc

Pulses, grains, oysters, muscle, and liver are the sources of it. Adults require 40 mg daily, adolescents require >10 mg daily, and infants require >4 mg daily. It supports sexual maturity, fertility, and cell development and proliferation as a component of metalloenzymes (77). Taste, appetite, and immunity are all enhanced. Copper and iron lower the absorption of it. Patients with kidney disorders and those who have been alcoholics may have a rare zinc deficit. Children that lack zinc experience slower growth. The emergence of gastrointestinal disorders and a weakened immune system are signs of zinc poisoning (78).

Silicon

The aortic connective tissue, which is made up of the aortic wall's collagen and elastin components, has higher silicon levels. Aging and atherosclerosis both lower silicon levels in the body. It appears that silicon lowers blood and aortic fatty acid levels. There is a connection between fatty acids and the development of atherosclerotic plaques. Research has demonstrated that taking supplements containing silicon can also help prevent osteoporosis (79).

Manganese

Nuts, cereals, and tea leaves are sources of it. Enzymes include arginase, glucosyltransferase, and succinate dehydrogenase need it. It is crucial for the production of chondroitin sulphate, which is necessary for cartilage growth (80). The RNA and DNA are stabilized by it. There is more than 15 mg of total body content, and 5–10 mg is needed daily. Both the pancreatic juice and bile excrete it. Lack of it results in improper bone growth, dermatitis, alopecia, glucose intolerance, and hair reddening. Central nervous system dysfunction is one of the symptoms of toxicity (81).

Fluoride

Some of its sources are fluoridated water, coffee, tea, seafood, grains, and vegetables. For dental polish to form, bones to mineralize, and dental caries to not occur, it is necessary. Tooth decay can be prevented by fluoridating water and putting fluoride in toothpaste. Children can receive fluoride salts through mouthwash, pills, or drops. According to 82,83, poisoning is the cause of dental fluorosis.

Iodine

Iodine can be found in eggs, dairy products, seafood, iodized salts, and water. It is essential for the body's normal development and growth. Iodine is necessary for the production of thyroid hormones. Iodine deficiency affects over 2.5 billion people worldwide. (84). Almost 50 million children worldwide suffer from inadequate iodine levels. Iodine is not stored by the body, hence it needs to be taken in tiny amounts all through life. For a very long time, regular salt that has been enhanced with iodine can be utilized as a successful intervention. Goiter can arise as a result of an iodine shortage. The recommended daily amount of iodine in the diet is 45 micrograms. In the form of povidone-iodine, it is also prescribed as an antiseptic and skin disinfectant (85).

Selenium

A mineral called selenium has been shown to have antineoplastic properties against breast and colon cancers as well as maybe other cancers. It's an organic antioxidant. The amount of selenium in the soil where food was grown determines the amount of selenium in the meal(86). It comes from both plant and animal sources. The highest dietary concentrations of selenium are found in muscular meat, grains, cereals, and dairy products such as egg. It participates in the synthesis of proteins and metallo enzyme, inhibits liver necrosis, increases pancreatic lipase secretion, and contributes to the production of ATP. Muscle necrosis, cardiomyopathy, and hemolytic anemia are the results of a selenium deficit (86). A surplus of selenium can lead to toxicity-induced dermatitis, hair loss, and a garlicky breath odor.

III. CONCLUSION

Collecting all types of vitamins in a study their sources, functions, excess and deficiency. They have an effective role in the body’s metabolism and immunity and

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in combating most diseases that affect the human body. Balancing them in moderate concentrations in the human body protects against the risk of contracting many diseases that affect adults and children. Therefore, every individual must take adequate food. It contains all types of vitamins, and in case of deficiency, it is compensated with manufactured vitamins.

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