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تأثير تغيير تركيز الزنك في دم الانسان على مناعة الانسان

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الملخص :

هدف الدراسة الحالية هو قياس مستوى تركيز أيون الزنك في مصل الأشخاص الذين يعانون من ضعف المناعة مما يسبب عدة أمراض منها مرض الروماتيزم، وقد أخذت الدراسة عدة نماذج منها مرض الروماتيزم وكذلك مضاعفات الأوعية الدموية و التطورات الحادة في أمراض الجهاز التنفسي، حيث يحدث خلل في سلامة الحاجز الظهاري (كوفيد-19) وما يصاحبه من التهاب رئوي حاد والتي تترافق مع أمراض بالإضافة إلى التهاب الجروح وبطء التئامها، وكلها من أسباب نقص أيون الزنك. كما تناولت الدراسة الأمراض الفيروسية المسببة لتلف الخلايا العصبية، والتي من خلالها يتم تقدير أيونات الزنك في مصل الدم لنماذج مختلفة، والطريقة المستخدمة هي مطياف الامتصاص الذري اللهبي (FAAS). لقد ربط العديد من الأشخاص من مختلف الأعمار والمراحل العلاقة بين نقص أيونات الزنك وظهور هذه الأمراض التي ينتج عنها فقدان حاستي الشم والتذوق.

كلمات مفتاحية : الدم ، المناعة ، فيروس

Effect Of Changing Zinc Concentration In Human Blood On Human Immunity

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Abstract:

The current study aims to measure the level of Zinc ion concentrationIn the serum of people who suffer from weak immunity, which causes several diseases, including rheumatic disease, and the study took several models, including rheumatic disease, as well as complications of blood vessels and acute developments in respiratory diseases, where a defect occurs in the integrity of the epithelial barrier (COVID-19) and the accompanying acute pneumonia, which be associated with a diseas addition to wound inflammation and slow healing, all of which are among the causes of Zinc ion deficiency. The study also dealt with viral diseases that cause nerve cell damage, Through which Zinc ions are estimated in blood serum for different models, the method that was used is a Flame atomic absorption spectrometer(FAAS). For several people of different ages and different stages to link the relationship between deficiency of Zinc ions and the emergence of these diseases which results in loss of smell and taste.

Keywords: Zinc deficiency ,COVID-19, Zinc rich diets, immune diseases

Introduction:

Zinc Where knowledge of immunity and its system is necessary for a life full of vitality, health and activity. This is done through the relationship between the different immune cells, The rate of infection with immunodeficiency is increasing dramatically and is a cause for concern, as rheumatism, arthritis, corona and Sjogren's syndrome[1] Zinc is present in all biological systems and plays a role and is used exceptionally in them. Zinc is also one of the components of more than 300 enzymes and plays an important role in the synthesis of DNA[2], metabolism and cell growth. deficiency is a problem in low- and middle-income countries, where low serum Zinc concentration indicates a prevalence of diseases, including dwarfism.[2]. Meat and animal products can be important to increase the availability of Zinc in the body, as well as the techniques of nutritional absorption of Zinc. Zinc deficiency causes poor physical growth and lack of immunity, and diseases spread in poor or low-income countries and regions. There are some inhibitors such as phytic acid of Zinc, which form insoluble complexes with it in water[2]. The adult human body contains 2-3 grams of Zinc, which makes it the second most trace element in the human body. Zinc is absorbed from the small intestine, and the excess is excreted through the kidneys with urine and through the large intestine through the stool, Only 0.1% of the Zinc content in the body is found in the blood There is a need to eat foods that keep the level of Zinc constant in the body without decreasing, as in Britain it is recommended to eat or take 9.5 mg of Zinc for men and 7 mg of Zinc for women, and that the daily Zinc intake does not exceed 25 mg. There are 60% of the total content of the body of Zinc in the muscles and 30% in the bones.[3] Zinc is one of the factors that reduce bacterial infection in gum(Periodontitis) and mouth infections[4]. Zinc is an important component of antioxidants that prevent cell membrane oxidation and reduce the formation of Zinc deficiency leads to oxidative damage [5]. The study of the causes of pituitary gland inflammation resulting from a deficiency of essential elements, including Zinc Especially women of childbearing age [6].The weak body resistance towards diseases and their causes and the decrease in body immunity when the level of Zinc is low in the body may be the reason for the person’s infection with respiratory diseases and COVID-19[7]. Zinc deficiency leads to a significant decrease in the content or a negative change in the structure of chloroplasts, which leads to a negative change in the process of photosynthesis in plants, as well as the role of Zinc in water absorption and transport in plants in the short term [8]. The reasons for Zinc deficiency are due to malnutrition, where plant nutrition is rich in phytate, as well as inflammatory reactions, and the deficiency can clear up in the form of symptoms of pneumonia, diarrhea, decreased sense of taste and smell, dwarfism, poor wound healing, and fatigue [7] .

Zinc is present in many foods, such as shellfish, meat and fish, either in poor countries or families that suffer from a low level of Zinc, most of its members, especially the young, suffer from Zinc deficiency [9]. A study conducted in Egypt showed that the growth rate was greater in patients taking Zinc supplements compared to patients who received iron instead or who relied on an appropriate protein diet [10].

Some studies in the Middle East have shown that Zinc deficiency leads to dwarfism, delayed sexual development, and a high susceptibility to for infections, poor appetite and mental lethargy . Zinc supplementation may be a treatment for its deficiency, the formation of cellular immunity, evasion of oxidative stress, and the reduction of the generation of inflammatory cytokines . In humans, Zinc in plasma is an indicator of its deficiency in the body [11]. Zinc deficiency affects the appearance of additional symptoms such as malabsorption, chronic sickle cell disease, kidney disease, and other debilitating conditions. Pygmies did not live in the Middle East for more than 25 years due to infections, which indicates that Zinc deficiency may affect Negatively on their immunity, females suffer from Zinc deficiency, ovarian weakness is noted, and the thymus hormone needs Zinc It is worth noting that the rate of Zinc in adults is 12-15 mg/d [11,21]. Zinc is necessary for the synthesis of DNA and RNA, as well as Zinc deficiency affects cytokines, which are the main messengers of the immune system [11]. Zinc deficiency is also associated with an increase in the level of ammonia in the plasma. Cirrhosis of the liver and sickle cell disease produce hyperZincemia in the urine A secondary Zinc deficiency [13]. A study was conducted on volunteers by giving them a diet based on soy protein, which provides calories, protein, and vitamins, with the exception of Zinc, which is given over a period in controlled doses, and to monitor the changes resulting from Zinc deficiency in peripheral blood cells (lymphocytes, granulocytes, and platelets) [14]. Zinc can have an effect on the bones by facilitating and regulating the pathway RANKL/RANK/OPG in the bones[15].

1. Zinc rich diets

A study conducted by Zahra Shahpar and her colleague showed that nano-Zinc, as well as organic and inorganic forms of Zinc, improves the weight of fish as a result of its effect On diet and intestinal absorption [16]. Zinc-rich foods, such as dried coconut and pumpkin, can also be used to increase the availability of Zinc in the body[17].

It was found that there is a close relationship between the bioavailability of minerals, including Zinc, and phytic acid, which is an inhibitor of Zinc absorption and lack of utilization, which is found in the seeds of some plants, including flaxseed[18]. Zinc occupies the forefront among the important ions of

the body due to the nature of enzymes that depend on Zinc in metabolism, and Zinc has a clear role in many functions of the body

Such as vision, perception, taste, cell reproduction, growth and immunity, and its deficiency causes an effective effect on adolescents more than others because of their growth spurt. Therefore, there is an interest in the World Health Organization in a persistent program that studies methods to reduce Zinc deficiency[19]. Zinc is an essential micronutrient, as its deficiency causes a defect in the immune system and oxidative stress. Zinc is found linked to metallothionein proteins inside the cells. It has been found that Zinc interferes with the virus reproduction cycle by disrupting and inhibiting viral disintegration, as well as interfering with the copying of the genome. When taking Zinc supplements, there is a significant decrease in the infection rate [20]. The physical and chemical characteristics, including lethargy, oxidative reactions, and cellular immunity, are due to Zinc deficiency. Which we see significantly in poor or middle-income countries as a result of the lack of purchasing power for foods rich in Zinc, such as oysters, which can be substituted for nuts, millet, and some grains. Africa has the highest rate of Zinc decline, followed by some countries in Asia, Latin America, and India [21].

.Acute lower respiratory tract disease (ALRI) which involves the lower respiratory tract

It is a cause of death for young children around the world, and it is estimated that 120-156 million children around the world suffer from (ALRI) and that about 14% cases it requires admission to a hospital, and the study included a survey of physical cases of children who have Zinc deficiency income, and this includes developing countries. It was found that taking food supplements containing Zinc in addition to animal foods, Zinc enhances antiviral activity and enhances the barriers of mucous membranes and white blood cells. The study has proven that Zinc is an organic compound It absorbs more than Zinc as an inorganic compound. [22].

It was found that the chelate compound between the Zinc ion and glycine in a ratio of 2:1, which is given for 3 times a day, is better than the rest of the organic compounds due to the availability of Zinc in cells [22].

It was found that millet grain contains a high percentage of iron and Zinc, much higher than the rest of the grain and others, 25.23 mg / kg, in addition to protein, and where the low cost of this product treats malnutrition [23-25].

Developing African countries such as Uganda, their children's food is of low quality from basic grains such as white corn and tubers such as potatoes. These materials are rich in calories, but lack vitamins, iron and Zinc. A mixture of

beans, beans and pumpkin was obtained that contains a high percentage of iron and Zinc [26].

Low levels of Zinc in pregnant women can lead to premature birth, miscarriage, and intrauterine death. As for the birth defects that the newborn suffers from, they include low weight, weak immunity, delayed growth of the reproductive organs, and neurobehavioral disorders. As for excessive intake of Zinc, although it rarely occurs It causes problems in the digestive system , Such as vomiting, abdominal pain, diarrhea, anemia, suppression of the immune system, prostate cancer, lethargy, and neurological disability [27]

There is also a food system that indicates the benefits of nutritional supplements, for example Zinc and vitamin C, which reduces colds, and there are some foods such as bones, garlic and omega-3. Alcohol and animal foods should be avoided and stress should be reduced, as vitamin A and C have been tried. As well as Zinc to reduce the rate of infection, including respiratory infections, for children who suffer from malnutrition. Studies have shown that oral Zinc provided in the form of Zinc lozenges of up to 7 mg for women and 9 mg for men significantly reduces colds [28].

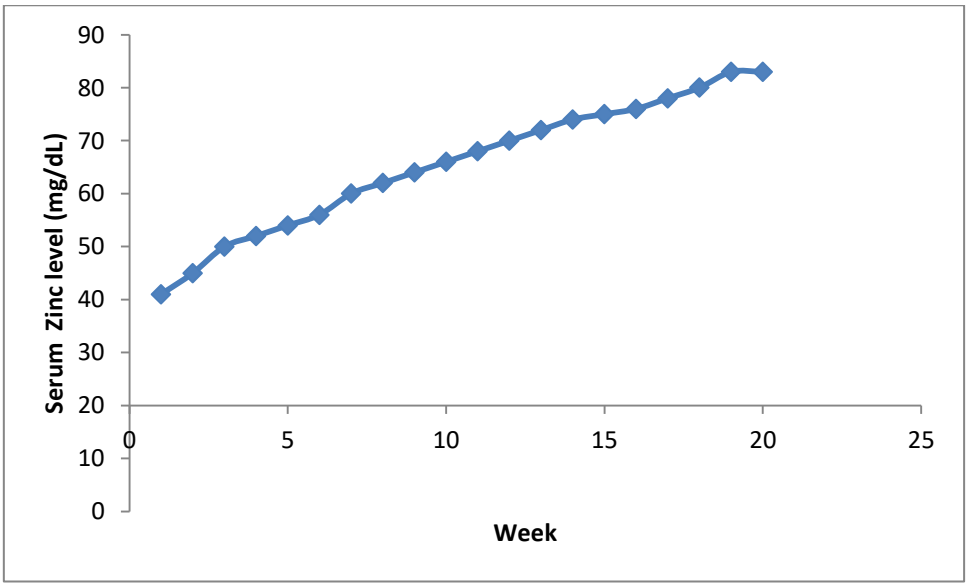

Fig.1. The effect of using nutritional supplements on changing the concentration of

Zinc ions in blood serum.

2. The rate of Zinc in humans and foods rich in it:

Zinc for adults between the ages of 19-64 years is about 10.71 mg for males and 7.98 to 8 mg for females. For those aged 11-14 years, it is 7.7 mg for males and 6.7 for females. As for children aged 1- 3 years old, it is 6.6-9 mg

Red meat is one of the most important foods rich in Zinc, while birds and fish provide a lesser amount of Zinc[29]

1- Important foods rich in Zinc, in which the rate of Zinc is higher than 15 mg, such as oysters and peanuts .

2- Foods that have a Zinc rate of 5-10 mg are beef, lamb, duck and wheat . 3- Foods that have an average of 3-4 mg of Zinc are beef liver, turkey, blue crab, corn and wheat flour. 4- Food between 1-2 mg of Zinc, which is found in chicken meat, shrimp, white wheat flour, blue cheese, and nuts. [29] Worldwide, grains and legumes are the main source of Zinc for most people because the physical condition does not allow obtaining the most rich sources of Zinc, such as oysters and meat, but in the United States, grains and legumes constitute about one-third of the body's need for Zinc, while meat constitutes half of the human body's need, while dairy products constitute about one-fifth of the body's need for Zinc[29]

3. Zinc inhibitors:

The phytate content negatively affects the bioavailability of Zinc, as it is high in oats, amaranth and flaxseeds, while it is moderate in black and yellow cornmeal and dry peas, while it is low in leafy vegetables, green beans and green peas. Phytate, which is a negatively charged part, is associated with the mono- and double-charged positive cations such as the Zinc ion, forming a stable complex in the neutral medium of acidity, which is in the range of 5-7 in the small intestine, which reduces the chances of absorption by the body of binary ions, including the Zinc ion[30-34]. Fermented foodstuffs, which is a successful method used by the Ethiopians, aim to reduce the percentage of inositol phosphate group from 460% to 50% or even 20%, and these materials are responsible for inhibiting trace element ions, including the Zinc ion [35].

4. Procedure:

To obtain the concentration of Zinc, blood samples were drawn from many people for specific periods of time, and blood serum was obtained from those samples. These samples were for different age groups (such as children, youth, and the elderly) and of both sexes. The focus was on those suffering from chronic diseases such as rheumatism, anemia, and heart disease. , And the data of people infected with Corona and those who gained recovery after that were obtained.

5. Effect of Zinc concentration on some diseases:

5. 1.The emergence of Corona disease:

In the year 2022, specifically in March, the World Health Organization announced an outbreak of the Corona virus SARS-COV-2, or what is known as

the Corona pandemic, and the disease spread to all continents, harvest the lives of hundreds of thousands of people in developed and poor countries alike [36]. Corona virus (Covid-19) is an infectious disease that affects humans and is the cause of shortness of breath, which is called acute respiratory syndrome (2Corona)[37]. Since December 2019, the number of infections with the Corona virus has increased, and cases of pneumonia appeared, and the disease appeared at its inception in the marine animal market in the Chinese city of Wuhan, which has a population of 11 million, and most of the places where infection occurred are in the marine animal market in the city [38]. During the first two months of the outbreak, the disease spread rapidly throughout China and caused varying degrees of infection [39]. The diagnosis was made with the help of clinical signs and electronic findings such as radiological examination or tomography, as well as laboratory analyzes. And blood chemistry, coagulation test, kidney and liver functions, measurement well as measurements of electrolytes andC-reaction protein, as well as the kinetics of creatine Lactate dehydregease [39]. Patients who attend the marine animal market in Wuhan and have chronic diseases were collected to be examined, and the patients were treated after they were isolated. The treatment was from 3-14 days, when the patients were given antibiotics, where 25% of them were treated and cured with one antibiotic, and 45% were given Among them were antifungal drugs, and they were cured [40]. As for the data, it was collected by a team of researchers from Wuhan University, and this data relates to epidemiological, clinical, laboratory, radiological, and treatment characteristics. The data included recorded information, which represents demographic data, medical history, history of exposure to the disease, signs and symptoms, laboratory results, and chest tomography [41]. All Corona patients received treatment with hydroxychloroquine, antibiotics, and multivitamins, including vitamin C (500 mg daily and Zinc 50 mg once a day [42]. Also, the infection with Corona disease was confirmed by following up the patients' condition through chest x-rays [43-49

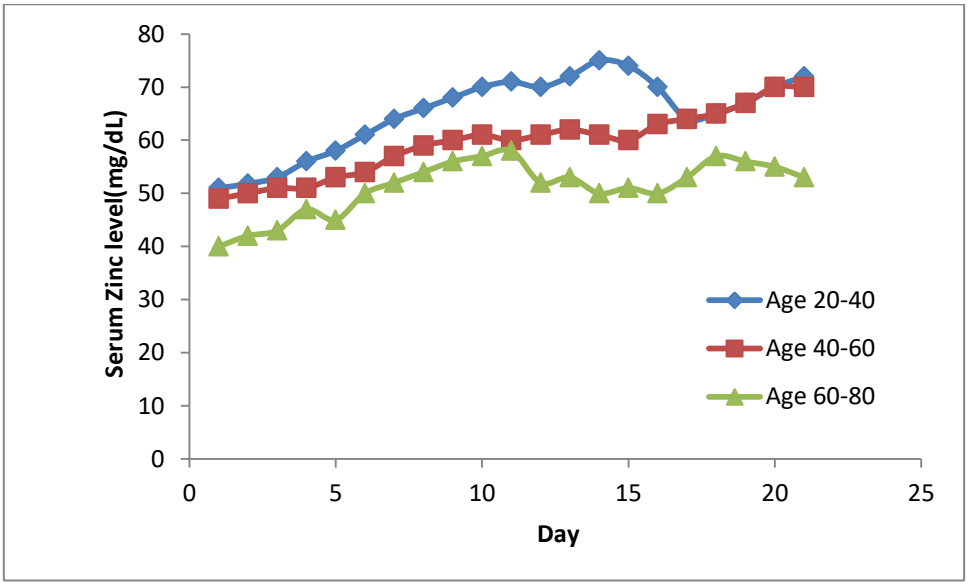

Fig.2. Measuring the Zinc ion concentration for different age groups infected with Corona during their stay in the hospital for 20 days

5. 2.Anemia and Zinc deficiency: Anemia is a disease resulting from iron deficiency, which is attributed to the poor absorption of iron due to a decrease in trace elements such as Zinc, which is found in the composition of enzymes, which stimulates the absorption of iron. Iron in an infected person is 44 mg/dL (Hb9.4) and a healthy person is about 91.7 mg/dL (Hb13.7) [50] . The fact that legumes contain phytic acid, fiber and calcium are factors that inhibit the absorption of Zinc and iron. Anemia afflicts low-income families in poor countries and even the United States, a country whose economy is the first in the world. 10% of children suffer from anemia [51]. There are drinks such as coffee that contain tannin, which is an inhibitor of Zinc absorption [52] When the level of Zinc decreases in Zinc in the blood, the body compensates for this deficiency from the stock of bones and muscles for the purpose of maintaining its percentage in the blood [53]. Zinc is the common factor for many enzymes and plays a role in iron metabolism. Zinc is also found in mineral proteins and hundreds of enzymes. It plays an important role in stabilizing the cell membrane, protein synthesis and tissue growth. Many studies aimed to detect the percentage of Zinc in patients suffering from anemia and iron deficiency. And to determine the relationship between Zinc and iron in anemic patients [54]. Zinc deficiency affects nearly two billion people, and the consumption of cereals that are high in phytates[55].

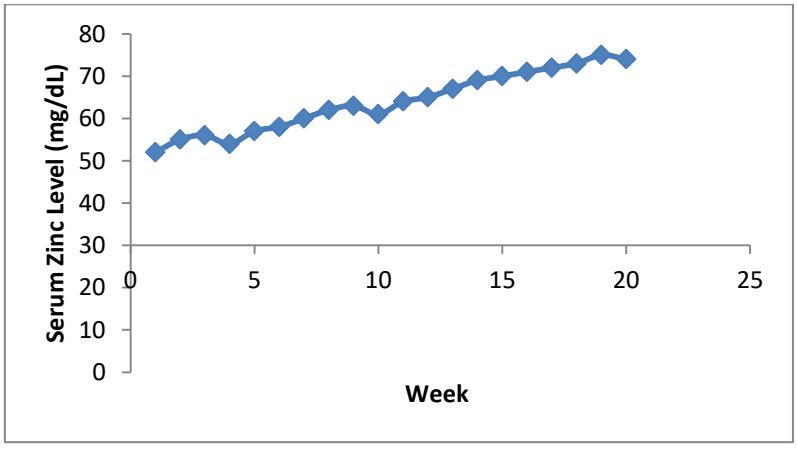

Fig.3 Measuring the Zinc ion concentration with anemia during their stay in the hospital for 20 days.

5. 3.Rheumatism and Zinc deficiency: Rheumatisms is one of the immune diseases that is controlled by genetics and the environment. Rheumatic pain causes weakness and inability to work. This disease primarily affects the joints, but it infects and harms outside the joints, such as the skin and eyes and heart, lung, digestive system and blood vessels [56] Trace elements play a role in

various bodily functions, such as hormone action and muscle contraction. Therefore, these elements can be considered involved in the treatment of disease, as Zinc, iron, and copper contribute. Low Zinc and higher copper levels are associated with disease activity. Increased metallothioneine forms a chelating complex with Zinc, which causes arthritis, as Zinc decreases. in plasma [56]. Zinc has an effect on bone formation, and its deficiency plays an important role in the activity of rheumatic disease. There is an increase in copper due to the synthesis of ceruloplasmate by the liver, as acute Zinc deficiency causes a decrease in fungi and adaptive immunity, which increases inflammation [56,57] The presence of free radicals in the body leads to cell death, as they are antioxidants, as Zinc contributes to them [58]. Zinc influences pathways involved in arthritis and there are several proteins that maintain Zinc levels In the blood, as Zinc transporters [59], and supplementation can be a treatment for Zinc deficiency, as its deficiency for a long time affects the lysosomes, where T cells and B cells are affected [59].

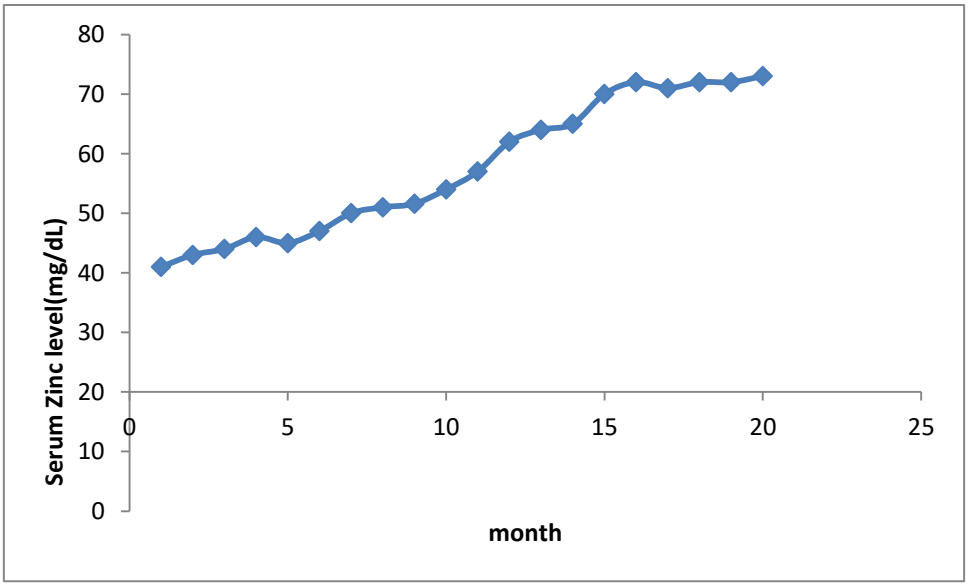

Fig.4.Measuring Zinc ion concentration with rheumatism during their stay in the hospital for 20 days.

5. 4.-Heart disease and Zinc deficiency: Heart diseases are diseases that continue to increase with age, and the diet plays an important role, so rely on nutritional supplements that provide trace elements, including Zinc, as it has specific levels in the blood serum with age Where it is preferable to eat beef, lamb, liver, grains, vegetables, nuts and legumes to secure Zinc, as Zinc performs many functions in the body as well as the formation of enzymes[60] Zinc can be bound to a metalloenzyme or be a stimulating agent for an enzyme reaction. Zinc is called the male component as it increases luteinizing and follicestimulating hormones that increase sperm production [60]. Zinc performs

its biological functions as a positive divalent ion that binds to enzymes and other proteins. It has a role in oxidation and reduction. This ion is indispensable for the growth and development of microorganisms as well as animals and plants. It participates in homeostasis, immune responses, oxidative stress, apoptosis and aging. There is only iron in hemoglobin that is more abundant of it [61,62]. Zinc in plasma is usually determined by several factors, including age, pregnancy, sex, and time of day, where it is higher in the morning than in the evening, and there is a relationship between Zinc metabolism, arterial hypertension, atherosclerosis, and cardiovascular congestion [61,62]. A study was conducted on mice and found that there is a correlation Between the lack of Zinc in the mother and the deformities of the fetal heart, and this also affects heart attacks, strokes, and sudden death resulting from heart failure, which is a clinical disease that includes poor heart efficiency in blood flow in the tissues, tissue congestion, and increased pulmonary capillary wedge pressure. It quickly converts and replenishes the body's deficiency, and many enzymes necessary for cardiovascular function depend on Zinc [61]. Zinc is a factor affecting innate and adaptive immune responses, vision, taste, cell reproduction, and growth. Dietary Supplements. Zinc has been proven to improve systolic rather than diastolic blood pressure. Nitric oxide is a major indicator of high blood pressure, as it has an effect on the widening of the arteries and reducing the activity of the sympathetic nerve, which is responsible for the contraction of blood vessels, where an abundance of oxygen interacts with nitrogen monoxide (NO) to form peroxynitrite (ONOO) which reduces NO levels [63]. Micronutrient deficiency generates Zinc deficiency, as micronutrients of animal origin are beneficial in raising the level of Zinc in the blood and anemia that affects ages between 6-11 months [64]. Zinc ion is present inside cells and is found in skeletal muscle. It is a stimulatory and skeletal cofactor, and Zinc deficiency leads to high rates of death from heart disease [65]. A deficiency of Zinc ions may occur in the serum of patients suffering from cardiac arrest, and the reason may be low dietary intake, low absorption of Zinc in the digestive system (intestines), poor movement, or the effects of medications for the disease [65]. The level of Zinc in the normal human heart is between 20-30 mg/g of heart tissue, and the total content of Zinc ions in the heart muscle is regulated by membrane-bound Zn+2 transporters, which adjust and regulate, and this reduces toxicity [66].

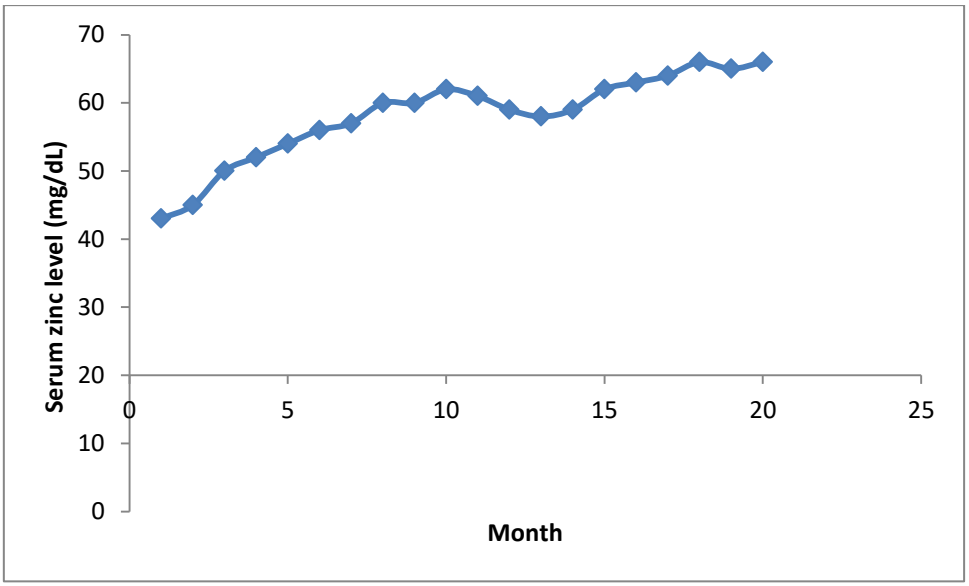

Fig.5.Measuring Zinc ion concentration with Heart disease during their stay in the hospital for 20 days.

5.5.Kidney disease and Zinc deficiency: Zinc deficiency and imbalance in its metabolism affect the gonads, the stimuli that produce androgens, although testosterone alternatives are needed to treat hypogonadism, as chronic kidney patients suffer from this deficiency, and this does not only affect sexual function, but affects muscles, anemia, depression, and high blood pressure. Blood pressure, diabetes and heart disease [67]. Chronic kidney disease is either a deficiency in vitamins and trace elements or an excess of nutrient toxicity. A low level of Zinc in the blood plasma is not treated by nutritional supplements because they fail to correct the low Zinc and part of the Zinc is lost with the urine, which explains the low efficacy of the supplements [63,68]. Patients who start dialysis have a lower hemoglobin concentration, and the reason is the decrease in the hormone erythropoietin, which is released from the kidneys. The anemia associated with chronic kidney disease is that hemoglobin consists of four chains linked to iron and the heme group, whose presence depends on an enzyme that depends on Zinc [69]. Zinc deficiency is associated with chronic kidney disease, and this is due to an increase in NADPH oxidase, which affects oxygenation and increases kidney damage [70]. The cardiovascular complications resulting from atherosclerosis are the main cause of death for chronic kidney patients. The effect of trace element deficiency, including Zinc, on people who suffer from obesity due to chronic kidney disease. Dialysis showed a significant improvement when increasing the percentage of Zinc in their bodies by Dietary supplements or medications (71) Zinc is also necessary for insulin synthesis, as Zinc deficiency affects insulin secretion [71-73]. Chronic kidney disease patients suffer from erectile dysfunction, and this can be treated with Zinc supplements [74].

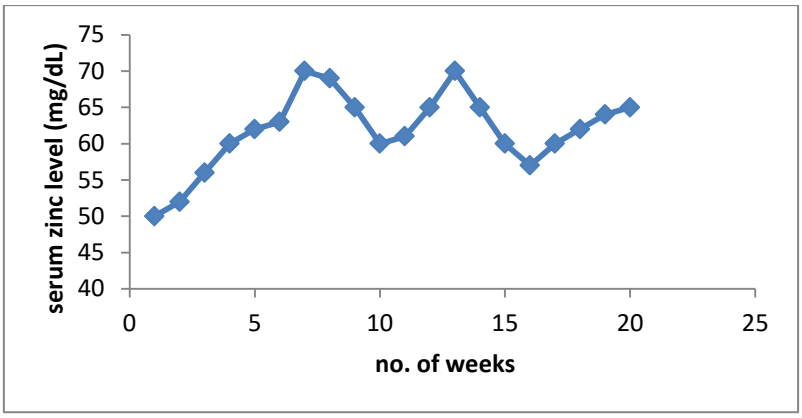

Fig.6.Measuring Zinc ion concentration for with Kidney disease during their stay in the hospital for 20 days.

5.6.Diabetes mellitus and its relationship to Zinc deficiency: Diabetes is a defect in the metabolism of several factors, which results from an imbalance of glucose. Zinc is a cofactor for antioxidant enzymes, so its deficiency impairs the synthesis of these enzymes and leads to oxidative stress within the cell. Zinc can protect the kidneys from damage caused by diabetes. Diabetes affects many body systems, including the kidneys, nervous system, and eyes, that Zinc deficiency plays a role in insulin and carbohydrate metabolism [75]. The relationship between diabetes, insulin and Zinc is complex, as Zinc plays a clear role in insulin synthesis, as well as the ability of the pancreas and its normal glucose tolerance [76]. High blood sugar is a manifestation of oxidative stress, or by increasing the production of oxidative oxygen, or by reducing the activity of antioxidants, which leads to damage to the metabolism of fats, proteins, and DNA, and changes in cell functions [77,78]. The continuous rise causes an increase in the production of free radicals in all tissues, especially reactive oxygen species (ROS) from glucose, and the concentration of Zinc can affect the storage or production of insulin, and the abnormal metabolism of Zinc can play an important role in causing diabetes, which is accompanied by oxidative stress, especially lipid peroxidation as a result Increased oxygen free radicals [78]. Some studies showed that patients who take insulin appeared to have a higher percentage of Zinc than patients who did not take insulin, and insulin was enhanced by a high Zinc concentration, and Zinc supplements may be a potential therapeutic aid for diabetics by enhancing insulin [79]. Intracellular Zinc control and regulation is essential for many Zinc-binding and transporter proteins such as metallothioneins Oxidative stress results primarily from elevated ROS production and decreased antioxidants, with Zinc acting in part as an antioxidant [80].

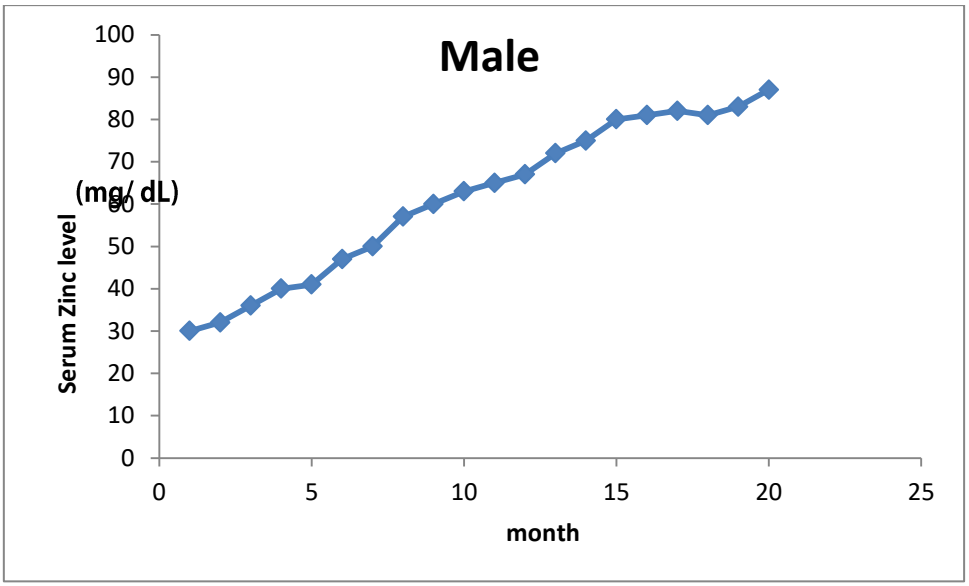

Fig.7. The effect of improvement in a diabetic patient on the concentration of Zinc in the blood

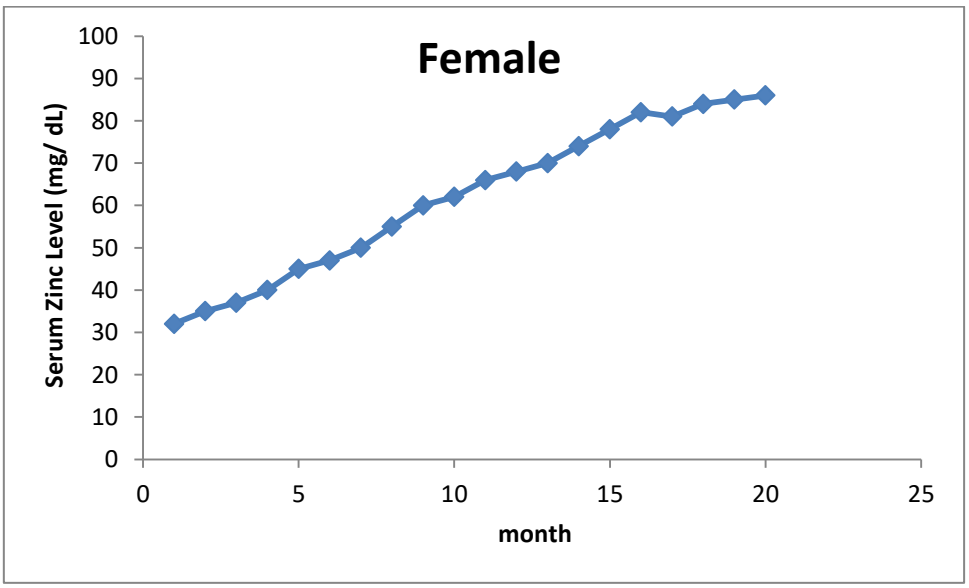

Fig.8. The effect of improvement in a diabetic patient on the concentration of Zinc in the blood

Table(1) showing the data of those infected with Corona virus, including the concentration of Zinc ions, iron stores in the blood, urea, and diabetes

No.	Sex	Age	Suger	B- urea	Zn^{2+}	Ferritin	D-dimer
1	woman	76	180	60.8	60	919	2529
2	woman	70	200	57.7	68	40	1140
3	woman	49	210	45.8	65	242	948
4	man	55	190	40	40	>1200	3268
5	woman	78	195	116	75	436	4528

6	man	50	185	33.9	60	465	>10000
7	man	61	110	30	80	103	432
8	man	36	164	35	81	58	131
9	woman	65	130	32	62	639	667
10	man	62	120	35	70	86	125
11	man	58	251	54.2	65	250	189
12	man	58	150	26	50	558	2044
13	woman	60	171	272	40	>1200	428
14	man	50	374	53.8	46	663	>10000
15	man	65	379	57.4	46	995	1481
16	woman	55	244	44.9	50	593	1403
17	man	70	365	54.9	56	524	1415
18	man	61	368	72.4	30	>1200	2680
19	man	57	127	45.9	20	>1200	>10000
20	woman	48	140	44	55	408	1732
21	man	65	136	73	72	91	1653
22	man	53	210	63	42	>1200	1141
23	man	36	109	19	45	>1200	563
24	man	60	275	53	41	>1200	7882
25	woman	45	376	47	62	549	282
26	woman	60	99	28	58	918	729
27	man	73	193	255	41	>1200	6911
28	man	50	324	50	70	336	1413
29	man	75	246	43	61	455	991
30	woman	82	241	135	65	335	3328
31	woman	70	180	43	67	94	613
32	man	72	163	39	20	>1200	9606
33	woman	62	132	30	75	33	451
34	man	45	199	48	50	899	5348
35	woman	46	185	46.6	24	>1200	8010
36	man	45	160	30	25	>1200	2163
37	woman	47	150	35	35	>1200	5870
38	man	53	450	87	40	>1200	667
39	woman	33	203	63	42	>1200	2002
40	man	34	157	41	56	835	1075
41	man	70	147	56	75	208	977
42	man	50	113	41	52	>1200	4712
43	woman	85	241	196	54	>1200	2806
44	woman	46	225	27	53	>1200	2836
45	man	53	450	87	41	>1200	667

Results : This study showed the effect of the concentration of Zinc ions on heart diseases, kidneys, diabetes, rheumatism, and most importantly, Corona. A conclusion was drawn, which is that these diseases are accompanied by a decrease in the concentration of Zinc ions in the blood serum, raising the concentration of Zinc ions through nutritional supplements may cause the patient to improve, but the patient's improvement of these diseases is accompanied by an increase in the concentration of Zinc ions in the blood serum.

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