

RESEARCH ARTICLE

A Statistical Study to Determine the Zinc Mineral Deficiency among Iraqi Women in 2019: Baghdad City as a Model

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Received: 19th March, 2021; Revised: 22th April, 2021; Accepted: 26th May, 2021; Available Online: 25th June, 2021

ABSTRACT

The percentage of zinc mineral deficiency was investigated in this research via a statistical study among women in Baghdad. This deficiency with some chronic and common diseases of the patients included in the study, was determined. In the first step of this research, data on this deficiency were collected from several private clinics and hospitals in Baghdad for a sample of women who conducted the plasma zinc blood test. The number of women surveyed was 800 during the year 2019, and the results obtained were classified according to the normal percentage of this test. In contrast, the second step dealt with detecting the relation between the deficiency of zinc mineral for the patients surveyed in the study with the two most common chronic diseases, diabetes and hypertension, and the relationship between the disease and muscle fatigue and sleep disorders alone. The statistical study results indicated that the level of zinc mineral was within the normal range (Sufficient) in 32.25% of the women in the study sample, and 51.125% had a deficiency (Insufficient) in zinc mineral. In comparison, 16.625% of women had a severe deficiency (Deficiency) in zinc mineral.

On the other hand, 39.097% of women with a normal level were suffering from hypertension, while diabetes was the prevalent disease in women who suffer from insufficient and deficiency of zinc mineral, which indicates a relationship between this disease and a deficiency of zinc mineral in women. While sleep disorders and muscle fatigue, they were distributed in approximate levels in all women surveyed. The months of summer season, which are May, June, July, and August, recorded the highest rates of zinc mineral deficiency among women in the city of Baghdad during 2019, while the months of winter season were the lowest, whereas the spring and autumn months were of closely levels.

Keywords: Baghdad, Deficiency, Women and Statistical study, Zinc mineral.

International Journal of Drug Delivery Technology (2021); DOI: 10.25258/ijddt.11.2.13

How to cite this article: Nussrat TH. A Statistical Study to Determine the Zinc Mineral Deficiency among Iraqi Women in 2019: Baghdad City as a Model. International Journal of Drug Delivery Technology. 2021;11(2):313-316.

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Minerals are micronutrients that the body cannot synthesize, and cannot be considered an energy source.¹ The minerals can be divided into two categories, the first one is called Major minerals, and it includes sodium (Na), potassium (K), magnesium (Mg), calcium (Ca), phosphorus (P), chloride (Cl), and sulfur (S). The second category is the trace mineral which includes iron (Fe), copper (Cu), iodine (I), manganese (Mn), molybdenum (Mo), chromium (Cr), selenium (Se), fluoride (F), and zinc (Zn) minerals.² Minerals play an important role in the human body, as they have three basic functions in the body, which help to build strong bones and teeth, controlling the amount of fluids inside and outside the cells, in addition to converting the food that is eaten into energy for the body to use.³ Zinc is considered as one of the basic minerals for the human body. It is found naturally in many food classes, and it can also be consumed by eating its nutritional supplements.

It is an important component of the human body, as it enters the functions of more than 100 enzymes.⁴ Zinc provides many health benefits to the human body, especially in the early stages of human life, and these benefits represented by activation of T lymphocytes, reducing the risk of diarrhea, regulating how neurons communicate with each other, which increases learning and memory capabilities, maintaining the health and safety of the skin, as it helps heal wounds, so it is approved in some skincare products, or those that help to treat skin irritation, reducing the risk of developing life-related chronic diseases, such as inflammatory diseases, because zinc has an important role in the functions of the immune system, reducing the risk of age-related macular degeneration disease because it protects the retinal cells from damage, improve symptoms of a genetic disorder known as Wilson's disease, also used in some products for treating acne and helps to gain weight, especially among those who suffer from anorexia, and

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it may play a role in improving the symptoms of depression that accompany it.⁵ Zinc is more available in animal sources than in plant sources, so people who follow a vegetarian diet are advised to double their intake of its sources.⁶ The most important sources contain beans, peas, red meat such as beef, lamb, and liver, seafood such as fish, some shellfish, crabs, lobsters and sardines, American walnut, dairy products, peanuts and wheat germ.^{6,7} It can be said that zinc deficiency occurs when the amounts of zinc in the human body are not sufficient for his needs.⁷ This may happen for several reasons, including lack of adequate quantities of zinc through the diet or poor absorption, and this deficiency may occur as a result of chronic diseases, such as diabetes, sickle cell anemia, ulcerative colitis, and other diseases.^{8,9} It is worth noting that zinc deficiency may increase the risk of human infection with many diseases and health problems, especially among children, as infecting children with zinc deficiency may cause growth problems, and increase the risk of infection, and it should be noted that the daily needs of the zinc component increase during pregnancy.^{10,11} Zinc deficiency is diagnosed with a plasma blood test, urine test, or other tests.¹² A person with zinc deficiency is recommended to change the diet, to include foods rich in zinc, and the doctor may prescribe zinc supplements based on his condition.¹³ Some symptoms may appear in people with zinc deficiency, these symptoms include loss of appetite, poor immune function, diarrhea, hair loss, poor wound healing, and unexplained weight loss.¹⁴ Eating 40 mg of zinc can be safe, but there are some concerns that a dose of more than 40 mg may reduce the absorption of copper in the body, which may cause anemia. It also warns against using nasal sprays that contain zinc; this is because it may lead to a permanent loss of sense of smell.¹⁵ Excessive zinc intake may cause some severe symptoms and problems for the human body such as fever, coughing, stomach pain, fatigue, and tiredness. It increases the risk of prostate cancer if taken more than 100 mg per day for more than ten years and finally causing death by consuming zinc dose of 10–30 grams.¹⁶ Thus, this study displays the distribution of zinc mineral deficiency between women in Baghdad city during 2019 as a statistical study and tries to find the relation between some chronic diseases and zinc insufficient.

Table 1: Results of patients' distribution due to plasma zinc blood test

Zinc mineral level	Reference range (µg/dL)	Number of cases	Percentage
Sufficiency	120 – 80	258	18.8
Insufficient	50–10	409	69.6
Deficient	> 10	133	11.6

Table 2: Distribution of patients results according to age category of women surveyed

Age Category (Years)	Number of Cases	Percentage	Zinc mineral level		
			Sufficiency	Insufficient	Deficient
15-24	125	15.625	36	78	11
24-40	234	29.25	62	125	47
>40	441	55.125	160	206	75

METHODOLOGY

Zinc mineral, which is taken as a tablet or generated naturally by the body from the food, is concentrated in the strongest muscles of the body, especially in white and red blood cells, the retina, skin, liver, kidneys, bones, pancreas, semen, and prostate gland in men that also contain large amounts of zinc. Thus the best test of zinc mineral is the analysis of plasma zinc blood test. In general, the deficiency or inadequate of zinc mineral is defined by a level, and a person is severely deficient in zinc mineral (*Deficient*) if the result of plasma zinc blood test is less than 50 µg/dL, while it is deficient (*Insufficient*) in the case of the result between 50–80 µg/dL. If the result is between 80–120 µg/dL, it is normal range (*Sufficiency*), but if it is higher than 150 µg/dL. It is at a level that may cause toxicity (*Potential toxicity*).¹⁷ The present study was performed in five private clinics in different regions of Baghdad in 2019 (from 1/1/2019 to 31/21/2019), which covered 800 cases of women and was laboratory monitored by a special questionnaire including the checking date, the clinical condition, and laboratory tests. The current search results comprised the laboratory analysis of plasma zinc blood tests and tests for chronic diseases, including diabetes, hypertension, sleep disturbance, and Muscle Fatigue for all women surveyed.

RESULTS AND DISCUSSION

Statistical analysis of the zinc mineral deficiency results was carried out by dividing the results into two groups; the first group was according to the laboratory test results, and the second group was according to the age categories of the cases.

Results Obtained, According to Plasma Blood Laboratory Tests

In the study, 800 women, surveyed in five private clinics and five private hospitals in Baghdad for one year, i.e., 2019, were sub-divided according to the results obtained from the laboratory tests of zinc mineral deficiency into the three categories. The 1st group concludes the normal level of zinc mineral (sufficiency), which ranged between (80–120) µg/dL, and the other group contains a low level of zinc mineral (Insufficient) ranged between (10–50) µg/dL. The last group comprises a deficient level of zinc mineral (Deficient) of a (>10) ng/mL value.

It's evident that from Table (1) and Figure (1) mentioned above, the ratio of zinc mineral deficiency takes the following sequence: *Insufficient* > *Sufficiency* > *Deficient* ratios.

Table 2 and Figure 2 show that the low ratio of zinc mineral is the highest according to the age category of women surveyed, followed by the ratio of Sufficiency cases of zinc mineral with

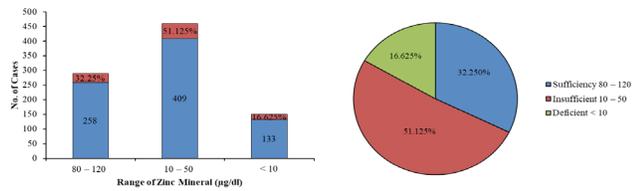


Figure 1: Zinc deficiency according to plasma zinc blood test for cases surveyed

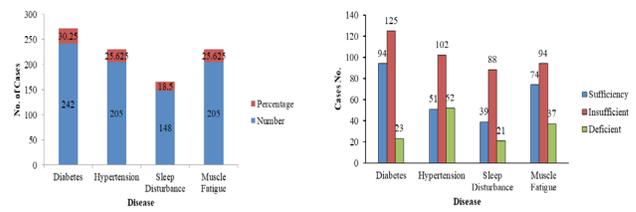


Figure 3: Relation of zinc deficiency with other diseases

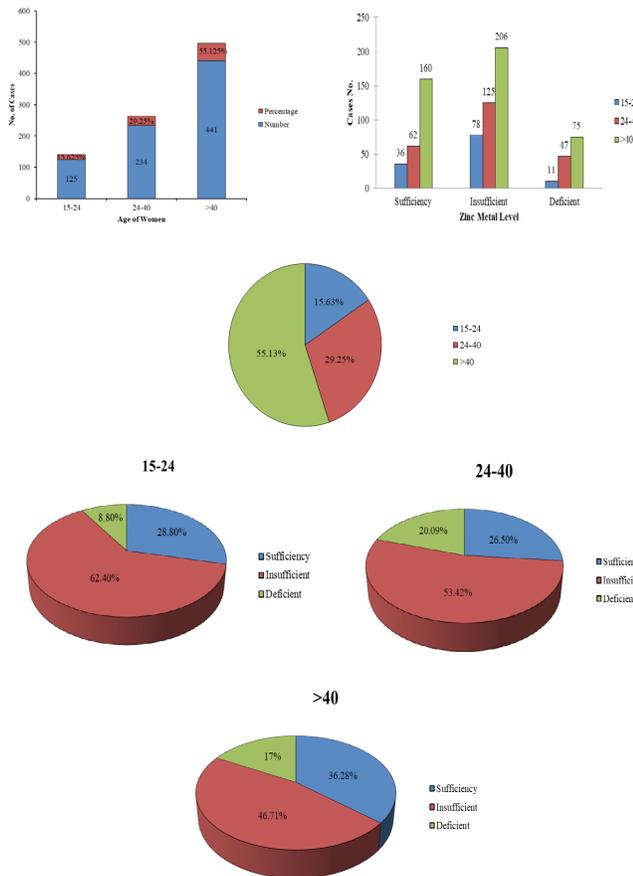


Figure 2: Zinc deficiency according to age of women surveyed an apparent decrease in the number of cases with the low ratio in patients with deficiency.

Two types of chronic diseases associated with zinc mineral deficiency studies, were diabetes and hypertension. As well as follow-up of some of the accompanying symptoms such as sleep disturbance and muscle fatigue were also studied, noting that the condition is probably the patient suffer from more than one disease at the same time. The results were as shown in Table 3 below.

Table 3 and Figure 3 above clearly show that diabetes represents the highest ratio of disease related to zinc mineral deficiency, which is flowed by hypertension, muscle fatigue, and sleep disturbance. While almost four diseases focused on women suffering from insufficient zinc mineral deficiency. It is also apparent that nearly half or more of the surveyed women have one or more diseases and insufficient zinc mineral, while the less ratio of disease occupied by women with deficient zinc mineral. A quarter to a third of the healthy women (i.e.,



women of sufficient zinc mineral) suffers from one or more of the above four diseases. These results indicate that there is a relation between this disease and zinc mineral deficient.

CONCLUSIONS

Two-thirds of the women surveyed had zinc deficiency. This percentage increases with age, as the proportion of women who are more than 40 years old who suffer from zinc deficiency is more than half. Zinc deficiency in the body is also associated with many chronic and other diseases, where the study found that the percentage of women who suffer from high blood pressure is the most among the other women who suffer from zinc deficiency.

RECOMMENDATIONS

- A zinc deficiency check is done regularly
- Eat more foods that contain zinc

Table 3: Relation of zinc mineral deficiency with other pathological cases

Disease	Number of cases	Percentage	Zinc mineral deficiency level		
			Sufficiency	Insufficient	Deficient
Diabetes	238	47.6	94	125	23
Hypertension	195	39.0	51	102	52
Sleep Disturbance	141	28.2	39	88	21
Muscle Fatigue	86	17.2	74	94	37

- Stay away from chronic pathogens and diseases related to fatigue, muscle fatigue, insomnia, and sleep disturbance.

These recommendations would help the body overcome this disease, which often leads to other diseases and complications that may last for long periods.

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