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Correlation between Zinc and Iron with *Psoriatic Patients* in Al-Anbar Governorate

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Abstract

Psoriasis is a common chronic, immune-mediated, inflammatory disease of the skin. It is relapsing, non-contagious disorder characterized by red patchy lesions, with grey or silvery-white, dry scales. Lesions are typically distributed symmetrically on the scalp, elbows, knees and essentially any part of the body. It is a disease with an unpredictable course, prone for flareups and remissions and can affect the joints and nails. The study included 60 patients (35 male and 25 female) and 30 healthy individuals (18 male and 12 female) as a control group. Their ages ranged from 10 to 60 years with a mean of 32 years. All had psoriatic lesions that involved less than 30% of body surface. Family history of psoriasis was positive in a percentage of (20%) of the patients. The majority of patients (n= 60, 100%) had plaque type psoriasis. The duration of disease ranged between 1 month to 30 years with a mean of 6.9 years. The sera of patients and control were collected in the dermatologist clinic and tested for the concentration of zinc and iron. The statistical analysis results showed a significant decrease in the concentrations of iron and zinc for psoriatic patients compared with healthy individuals.

Keyword: Psoriasis, plaque psoriasis, zinc, iron.

Introduction

Psoriasis is a common chronic, immune-mediated, inflammatory disease of the skin [(1)]. It is relapsing, non-contagious disorder characterized by red patchy lesions, with grey or silvery-white, dry scales [(2)]. Lesions are typically distributed symmetrically on the scalp, elbows, knees and essentially any part of the body. It is a disease with an unpredictable course, prone for flareups and remissions and can affect the joints and nails[(3)].

Psoriasis is generally categorized into one of three severities based on the extent of body surface covered. Where 2% of the body is affected, it is classified as mild, where 3-10% of the body is covered, it is classified as moderate and where more than 10% of the body is affected, the disease is classified as severe. Based on these criteria, approximately 25-30% patients have psoriasis, which is considered moderate to severe [(4)].

It can afflict both men and women, and usually begins in early adulthood

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although it has been reported at birth. There is a bimodal distribution in the age of onset. Type I or early onset psoriasis typically appears in individuals between ages 15 to 20 years and shows a tendency to disseminate, greater number of relapses, and higher frequency of familiar history of psoriasis when compared with Type II or late onset psoriasis during or after the fifth decade of life [5, 6, 7].

Psoriasis is distributed worldwide but its prevalence varies among different geographical areas and ethnic groups [8]. In Iraq, approximately 2.3% of the population is affected [9]. The immune system has been strongly implicated in the pathogenesis of psoriasis that resembles a T cell-mediated disease [10]. T cells are found in the dermis and epidermis and are accompanied by increased numbers of dermal dendritic cells, macrophages and mast cells[11].

Several environmental factors are recognized as triggers and exacerbators for psoriasis among which: infections [12], alcohol and smoking [13], family history (genetics) [14], trauma [15], stress [16], drugs [17] and diet [18]. Clinical types of psoriasis can be classified according to phenotype-based classification that intended for use in both clinical practice and researches: plaque psoriasis, guttate (Eruptive) psoriasis, generalized pustular psoriasis, palmoplantar pustular psoriasis, psoriatic arthropathy, eryth-rodermic psoriasis, scalp psoriasis, nail psoriasis[19].

Iron is a trace element that is essential for life, being required for important cell processes such as DNA synthesis, energy production and defense. Many different structural and enzymatic proteins contain iron, which is essential to their function. In some of these proteins, iron (in the ferrous or Fe^{2+}form) is found in the center of a porphyrin ring, forming a heme prosthetic group[20].

Serum iron is a medical laboratory test that measures the amount of circulating iron that is bound to transferrin. Clinicians order this laboratory test when they are concerned about iron deficiency, which can cause anemia and other problems. 65% of the iron in the body is bound up in hemoglobin molecules in red blood cells. About 4% is bound up in myoglobin molecules. Around 30% of the iron in the body is stored as ferritin or hemosiderin in the spleen, the bone marrow and the liver. Small amounts of iron can be found in other molecules in cells throughout the body. None of this iron is directly accessible by testing the serum.

However, some iron is circulating in the serum. Transferrin is a molecule produced by the liver that binds one or two iron(III) ions, i.e. ferric iron, Fe^{3+}; transferrin is essential if stored iron is to be moved and used. Most of the time, about 30% of the available sites on the transferrin molecule are filled. The test for serum iron uses blood drawn from veins to measure the iron molecules that are

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bound to transferrin, and circulating in the blood[21].

Zinc is an essential mineral that is naturally present in some foods, added to others, and available as a dietary supplement. Zinc is involved in numerous aspects of cellular metabolism. It is required for the catalytic activity of approximately 100 enzymes[22,23], and it plays a role in immune function[24], protein synthesis[25], wound healing[26], DNA synthesis, and cell division. Zinc also supports normal growth and development during pregnancy, childhood, and adolescence[27,28,29], and is required for proper sense of taste and smell[30]. A daily intake of zinc is required to maintain a steady state because the body has no specialized zinc storage system[31].

Materials and methods Determination of Iron

Serum iron was determined by the using of colorimetric method, by a ready kit from reliable scientific company.

Principle

The Fe^{+3} bound to serum ferritine once dissociated in a week-acid medium by Teepol and guanidium chloride, is reduced by hydroxylamine to Fe^{+2}, forming the ferrous ion a colored complex with ferrozine proportional to the concentration of iron present in the sample[32].

Samples

Serum or heparinized plasma. Centrifuge specimen as soon as possible after collection. Hemolyzed samples are rejected. Ruptured red cells falsely elevate the serum results. Iron in serum is stable for 3 weeks at 28ºC and for about 7 days at 20-25ºC. Freeze for longer storage.

Procedure

Bring reagents and samples to room temperature and pipette into sample labeled tubes 1 ml of reagent and 200µl of sample, mix and let the tube stands for 5 minutes at room temperature. Read the absorbance (A) of the samples and the standard at 560 nm against the blank. The standard tube is made by the addition of 200 µl of standard solution to 1 ml of sample. Eventually calculate the concentration of iron by the comparison with the standard solution absorbance.

Determination of zinc

Serum zinc was determined by the using of colorimetric method, by a ready kit from reliable scientific company.

Principle

Zinc reacts with the chromogen present in the reagent forming a colored compound which color intensity is proportional to the zinc concentration present in the sample [33].

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Samples

Serum or heparinized plasma. Hemolyzed samples are rejected. zinc in serum is stable for 1 weeks at 2-8ºC. Freeze for longer storage.

Procedure

Bring reagents and samples to room temperature and pipette into sample labeled tubes 1 ml of reagent and 50µl of sample, mix and let the tube stands for 5 minutes at room temperature. Read the absorbance (A) of the samples and the standard at 578 nm against the blank. The standard tube is made by the addition of 50 µl of standard solution to 1 ml of sample. Eventually calculate the concentration of zinc by the comparison with the standard solution absorbance.

Results and Discussion

The concentrations of iron and zinc are shown in the table 1 below:

(Table 1) the concentration of iron and zinc in **µg/dl**

No.	Iron µg/dl	Zinc µg/dl	No.	Iron µg/dl	Zinc µg/dl	No.	Iron µg/dl	Zinc µg/dl
1.	25	93.2	31	47	178	61	59	67.8
2.	142	119	32	22	33.9	62	113	508
3.	63	153	33	39	178	63	97	678
4.	13	33.9	34	29	8.47	64	182	593
5.	52	67.8	35	29	42.4	65	42	678
6.	27	67.8	36	50	186	66	73	373
7.	109	16.9	37	44	16.9	67	75	398
8.	32	25.4	38	71	25.4	68	83	153
9.	84	67.8	39	14	93.2	69	103	288
10.	85	8.47	40	106	76.3	70	48	525
11.	18	84.7	41	48	84.7	71	168	144
12.	59	50.8	42	44	84.7	72	55	305
13.	22	33.9	43	61	76.3	73	30	42.4
14.	58	93.2	44	29	76.3	74	47	254
15.	39	102	45	64	25.4	75	75	119
16.	34	119	46	11	25.4	76	27	339
17.	37	203	47	25	59.3	77	61	288
18.	51	93.2	48	39	50.8	78	74	559
19.	72	169	49	71	84.7	79	62	288

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20.	93	8.47	50	81	67.8	80	51	483
21.	60	67.8	51	20	76.3	81	85	508
22.	19	16.9	52	62	76.3	82	75	508
23.	14	84.7	53	17	25.4	83	83	492
24.	86	50.8	54	67	25.4	84	113	644
25.	30	169	55	54	59.3	85	42	271
26.	42	59.3	56	127	50.8	86	148	229
27.	54	33.9	57	68	84.7	87	55	432
28.	83	2.54	58	80	67.8	88	39	475
29.	48	322	59	26	76.3	89	47	212
30.	89	203	60	66	59.3	90	74	153

The statistical analysis results showed a significant decrease in the concentrations of iron and zinc for psoriatic patients compared with healthy individuals ($p<0.05$) as shown below table 2:

No.	parameters	factor	mean	Std. deviation	t-value	Pvalue
1	Iron µg/dl	patient	52.5167	29.15214	-3.235	0.002
		control	76.3103	38.66533		
2	Zinc µg/dl	patient	78.2675	59.91635	-10.92	0.000
		control	366.6966	186.58224		

The figures below also explain the significant decrease of both iron and zinc in psoriatic patients compared with healthy individuals.

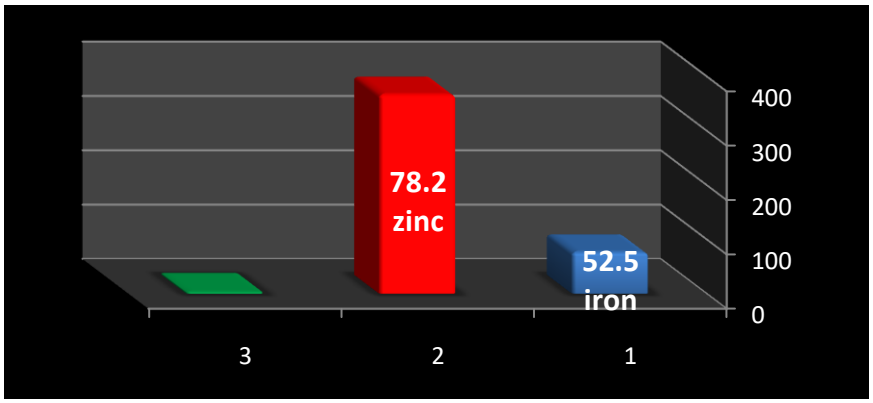

Figure 1 the mean values of patient's Zn and Fe.

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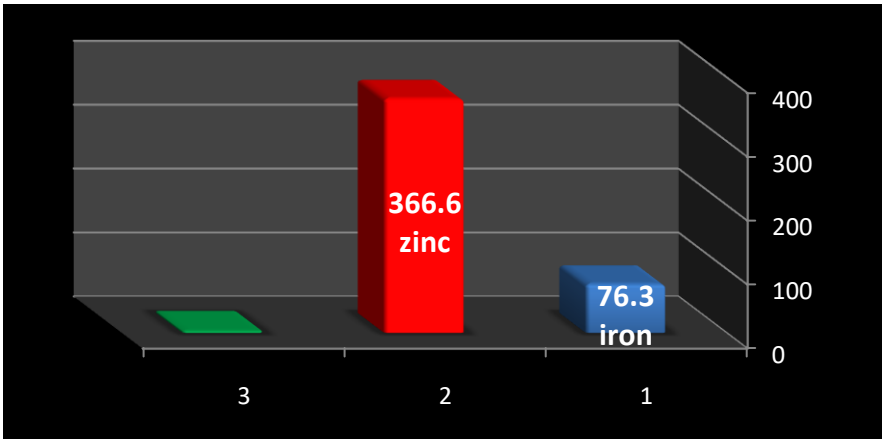

Figure 2 the mean values of control Zn and Fe.

Zinc and many other trace metals are known to be among the constituents of the skin and to play essential roles in maintenance of its function in association with the enzyme systems activated by trace metals[34,35]. Therefore most of psoriatic patients obtained benefit from oral zinc treatment[36]. Many other studies showed also significant decrease in the level of serum zinc but the administration of oral zinc changes nothing, therefore they believed that systemic zinc deficiency is unlikely to be the basic error in psoriasis[37].

Accelerated loss of nutrients from the hyperproliferation and desquamation of the epidermal layer of skin in psoriasis has been reported[38]. It can be speculated that Fe may be lost due to desquamation. Fe is an important requirement of cell division, therefore it is depleted during the rapid turnovers of skin cells.

The presence of excess Fe in skin tissues has been demonstrated in many skin diseases involving an inflammatory response including psoriasis[39,40]. From these facts and our results it seems that psoriasis is a rapid cell divisions and Fe is an important requirement of cell division, therefore it is depleted.

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