

Evaluation Of Serum Zinc, Magnesium, And IL-5 In The Individuals Affected With Diabetic Retinopathy.

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Abstract:

Background: Individuals who have diabetes are at an increased risk for several microvascular and macrovascular issues, including the well-known microvascular condition diabetic retinopathy (DR). Those who have diabetes have an increased risk for a variety of cardiovascular and vascular disorders.

Aim: Therefore, the aim of this study is to study serum zinc, magnesium, and Interleukin (IL-5) in diabetic retinopathy.

Materials & methods: After institutional ethical committee approval, researchers would proceed. Participants gave informed permission before the trial. 100 diabetic retinopathy patients and 100 healthy controls participated. Indore's Index Medical College & Research Centre (IMCRC) outpatient departments would analyze both groups. This prospective observational study follows Indore IMCHRC Ophthalmology patients. This prospective observational study follows Indore IMCHRC Ophthalmology patients. Ophthalmoscopy and a fundus fluorescein angiography were also components of this test. After that, the ETDRS Grading System was utilized to provide each patient with a score that reflected the degree to which their retinopathy was affected.

Results & Conclusion: Serum zinc levels correlated with diabetic retinopathy severity. This study compared diabetic retinopathy patients to healthy controls. Serum magnesium values correlated with diabetic retinopathy stage. IL-5 levels were significantly inversely related to diabetic retinopathy severity. Whole blood zinc, magnesium, and IL-5 levels were linked to diabetic retinopathy severity in this investigation of healthy controls and DR patients. The researchers concluded that there was a significant link between the levels of serum zinc, magnesium, and IL-5 and the presence of diabetic retinopathy.

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I. Introduction:

Diabetic retinopathy (DR) is a microvascular disease that is well-known among people with diabetes [1-5]. There have been reports from around the world that people with inflammatory illnesses lose important minerals like zinc and magnesium through their urine. Mineral bioavailability appears to be particularly prone to free radical damage, which has been observed to be enhanced during hyperglycemia [6-10]. Mineral loss can reduce the body's mineral content, which can impact mineral concentrations including zinc and magnesium [10-16]. The scientific community knows very little about the status of zinc and magnesium in persons with psoriasis. This study's biomarkers could assist people with psoriasis diagnose and treat concomitant conditions. Accurate prediction of diabetic retinopathy risk variables will aid in lowering disease severity and aiding earlier diagnosis [11]. As a result, we focused the current study's design on the evaluation of study parameters in persons with altered glycemic levels, including hyperglycemia [12]. The authors evaluated inflammation as a factor in psoriasis by assuming that a physiological concentration level of lipids, zinc, magnesium, and glucose will modify the level of inflammatory markers responsible for psoriasis disease progression [12]. Because the findings of previous studies on the connection between DR and lipid profile, zinc, magnesium, IL-5 and glucose profile levels have yielded results that are incongruent with one another, a study of this kind is urgently required [7]. This is because the findings of previous studies on the connection between diabetic retinopathy and cholesterol levels [8]. We can greatly cut down on the number of mistakes that are caused by the vast number of different ethnic groups that we investigate as a result of the fact that the majority of our research is concentrated on the population of this particular region. If there is a major impact that lipid levels play in diabetic retinopathy, then maintaining management of lipid levels could be advantageous for diabetic retinopathy [9,10]. Given earlier research on the relationship between DR and lipid profile, zinc, magnesium, IL-5, and glucose profile levels produced contradictory results, a study of this type is urgently needed [11-14]. In addition, as part of this investigation, the effect that controlling mineral levels has on the prevention of diabetes related complications and the slowed progression of the disease in our community is being investigated [19-21]. This will be accomplished by analyzing the differences in zinc,

magnesium, and IL-5 levels between the individuals of the present study. Therefore, the aim of this study is to study serum zinc, magnesium, and IL-5 in diabetic retinopathy.

II. Materials & methods:

After institutional ethical committee approval, researchers would proceed. Participants gave informed permission before the trial. 100 diabetic retinopathy patients and 100 healthy controls participated. Indore's Index Medical College & Research Centre (IMCRC) outpatient departments would analyze both groups. This prospective observational study follows Indore IMCHRC Ophthalmology patients. All participants in both groups had a general physical examination by a hospital medical department physician. 100 age- and gender-matched non-diabetic retinopathy patients formed the healthy control group. The second group had 100 T2DM patients. American Diabetes Association guidelines diagnosed diabetes and diabetic retinopathy. The control group would be normal-glycemic, age- and gender-matched. A licensed doctor examined all subjects. ADA guidelines indicated T2DM. Controls excluded type 1 diabetes and diabetic retinopathy patients with fewer than five years of established T2DM duration and pathological symptoms. Corneal opacity, cataract, vitreous hemorrhage, pre-existing retinal diseases other than DR, extreme myopia, advanced glaucoma, severe anemia, renal disease, and hypertension produce hazy media. Non-diabetic healthy controls did not take multivitamin supplements and had no secondary diseases. DR patients are over 40, male or female, and have had T2DM for 5–15 years. One hundred patients who met both inclusion and exclusion criteria were selected for a complete ophthalmological examination at initial presentation. This examination includes ophthalmoscopy and fundus fluorescein angiography. After that, the ETDRS Grading System scored each patient depending on retinopathy severity. Serum zinc, magnesium, and IL-5 assays followed blood collection. Fasting venous blood (5ml) was drawn into EDTA and plane vials, after informed written consent from all the study group subjects. Serum and plasma were separated by centrifuging the blood at 3000 rpm for 20 minutes and stored in aliquots at -20o C until assayed.

III. Parameters analyzed:

In the study that Zasoski and colleagues carried out, they evaluated the levels of zinc and magnesium that were present in serum (1977). By sending these atoms through the flame, which causes them to get excited and causes them to absorb the specific wavelength that is limited to only them, the calculation of the concentration is made feasible. Following a period of twenty-four hours spent in nitric acid, the glassware was then washed five times in milli-Q water before being dried and placed back into use. Zinc and magnesium standards: Using 1000 ppm zinc and magnesium stock solutions, calibration curve values of (50, 100, 150, 200, and 250 g/dL) and (0.50, 1.5, 2.5, 3.5, and 4.5 mmol/L) were freshly created by serial dilution. The absorbency of each sample was determined using an atomic absorption spectrophotometer. The absorbencies of the samples were tested and compared to established reference standards in this investigation. An analyte Elisarray kit that was manufactured by Qiagen laboratories was used to determine the concentration of IL-5 cytokine in the serum. Using this kit, we were able to determine the amount of IL-5 cytokine that was present in the blood.

IV. Statistical analysis:

Newest version of IBM SPSS was used for all statistical analysis. The Unpaired t-test is the appropriate tool to employ when contrasting the averages of variables from two independent samples. In order to learn more about the link between the two variables, we used the Pearson correlation. This finding is statistically significant because the significance level is smaller than.05.

V. Results:

According to the findings of our study (Table 1), diabetics who do not have retinopathy have mean levels of serum zinc that are 148.2, but diabetics with NPDR have mean levels of 131.2, and diabetics with PDR have mean levels of 102.1. Because of this, the p value for the association between blood zinc levels and the severity of diabetic retinopathy is < 0.05, which suggests that there is relevance between the two. This is because the value indicates that there is correlation between the two. According to the findings of our study (Table 2), diabetics who do not have retinopathy have mean levels of serum magnesium that are 1.7, but diabetics with NPDR have mean levels of 1.2, and diabetics with PDR have mean levels of 0.9. Because of this, the p value for the association between blood zinc levels and the severity of diabetic retinopathy is < 0.05, which suggests that there is relevance between the two. This is because the value indicates that there is correlation between the two. According to the findings of our study (Table 3), diabetics who do not have retinopathy have mean levels of serum IL-5 that are 6.3, but diabetics with NPDR have mean levels of 6.2, and diabetics with PDR have mean levels of 8.7. Because of this, the p value for the association between blood zinc levels and the severity of diabetic retinopathy is < 0.05, which suggests that there is relevance between the two. This is because the value indicates that there is correlation between the two.

Table 1: Serum zinc levels of the DR subjects in the present study

	Healthy controls (a)	No DR (b)	NPDR (c)	PDR (d)
Mean (µg/dL)	149	148.2	131.2	102.1
SD	33.1	22.4	33.2	34.8
P value	a vs b: > .05 a vs c: < .05 a vs d: < .05	b vs c: < 0.05 b vs d: < 0.05	c vs d: < 0.05	

Table 2: Serum magnesium levels of the DR subjects in the present study

	Healthy controls (a)	No DR (b)	NPDR (c)	PDR (d)
Mean	2.1	1.7	1.2	0.9
SD	0.2	0.3	0.3	0.1
P value	a vs b: < .05 a vs c: < .05 a vs d: < .05	b vs c: < 0.05 b vs d: < 0.05	c vs d: < 0.05	

Table 3: Interleukin-5 (IL-5) levels of the DR subjects in the present study

	Healthy controls (a)	No DR (b)	NPDR (c)	PDR (d)
Mean	4.2	6.3	6.2	8.7
SD	0.9	0.6	0.7	1.1
P value	a vs b: < .05 a vs c: < .05 a vs d: < .05	b vs c: > 0.05 b vs d: < 0.05	c vs d: < 0.05	

VI. Discussion:

Our study discovered that diabetics who did not have retinopathy had mean blood zinc levels of 148.2, but diabetics who had either NPDR or PDR had mean serum zinc levels of 131.2 or 102.1 respectively. In addition, diabetics who do not have retinopathy have mean serum magnesium levels of 1.7, whereas diabetics who have NPDR have mean serum magnesium levels of 1.2 and diabetics who have PDR have mean serum magnesium levels of 0.9. This is because diabetics with retinopathy have lower magnesium levels in their blood. When healthy controls and diabetic retinopathy participants are compared, the p value for the association between blood zinc and magnesium levels and the severity of diabetic retinopathy is less than 0.05. This is because of the reason stated above. This shows that there is some kind of relationship between the two, which in turn indicates that there is some kind of importance between the two. This is because the value indicates that there must be some kind of connection between the two in order for this to be the case. Roshtamkhani et al. [24] found that patients with DR had lower serum zinc levels as compared to healthy controls in their cross-sectional investigation. In addition, Luo et al. [25] came to the conclusion that equivalent findings arose when non-diabetics and diabetics with varied degrees of DR were studied. The magnesium levels in the serum of the people were tested in the aforementioned studies [11-13], and the results showed that those with DR had lower magnesium levels. It is likely that zinc and magnesium were lost in the urine of people with DR who were impacted by the disease. This is the possible explanation for why the levels of these minerals were lower in the subjects of the current study who had DR.

It was discovered that diabetic retinopathy and serum IL-5 levels have a connection that is statistically significant between the two conditions. Even though the majority of these studies focused on albuminuria and proteinuria levels, a number of earlier investigations have discovered a connection between type 2 diabetes and diabetic retinopathy. During the course of our inquiry, however, we did take serum IL-5 into consideration; nonetheless, we excluded people who had high serum interleukin levels from our analysis. Researchers Ahmad R. and colleagues [19] discovered that those who had diabetes had a greater positive link between IL-5 and BMI, FBs, and HbA1c than individuals who did not have diabetes did. Adipose tissue is where cytokines and adipokines are stored during times of not active production. Research conducted by Pirola L et al. [20] found a correlation between the maintenance of adipose tissue homeostasis in lean individuals and the presence of anti-inflammatory M2 macrophages and Th subsets. These Th subsets included Th2 and T-reg cells and released anti-inflammatory cytokines such as IL-10, IL-5, and interferon-. In their study, Hang et al. [21] discovered that participants with diabetes mellitus had lower amounts of IL-5 in their serum in comparison to the controls in their trial. On the other hand, Chen et al. [22] found in their investigation that there was no significant difference in the levels of IL-5 found in the serum of the participants who acted as the study controls as compared to the participants in the experimental group.

VII. Conclusion:

The researchers concluded that there was a significant link between the levels of serum zinc, magnesium, and IL-5 and the presence of diabetic retinopathy. Furthermore, we believe that the small size of our study's sample, which does not provide a realistic representative of the entire population, is a limitation of our research. Although only patients who visited the Ophthalmology Outpatient Department were selected for inclusion in the study, no attempt was made to account for those who did not seek medical help.

Conflict of interest:

No existence of conflict of interest among the authors of the study.

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