Original Article

Evaluation Of Zinc, Magnesium And Glycated Hemoglobin In The Individuals Affected With Psoriasis

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DOI: 10.47750/pnr.2022.13.S10.171

Abstract

Background: People with autoimmune diseases like psoriasis are unlikely to find a natural treatment that is powerful enough to make up for the pathophysiological abnormalities that have developed. **Aim:** The aim of the present study is to compare and correlate the association of zinc, magnesium, and glycated hemoglobin in the individuals affected with psoriasis and the non-psoriasis controls. **Materials & methods:** Four hundred (400) individuals participated in the current study, divided evenly between the psoriasis group and the healthy control group. Utilizing the outpatient services of the Index Medical College and Research Center in Indore, examinations were conducted on each and every participant in both groups. After receiving green light from the institution's ethics board, the authors of the study proceeded with the project. **Results:** We tried to find the association between the serum levels of zinc and MDA in healthy controls. We observed a negative association ($y = -0.0247 + 27.236$) between serum zinc and MDA; zinc and HbA1c ($y = -0.05035x + 5.868$) in non-psoriasis control group. **Conclusion:** The fact that persons with psoriasis have lower levels of zinc transporters than people who do not have psoriasis is the root cause of this imbalance. According to the findings of this study, there is a correlation between having psoriasis and having altered levels of zinc and magnesium levels in the body.

Introduction:

Psoriasis is a skin condition characterized by scaly, itchy rashes on the knees, elbows, trunk, and head. Psoriasis is a prevalent, chronic (ongoing) skin disorder [1]. It can be unpleasant, interfere with sleep, and make focus difficult [2]. Psoriasis can begin at any age, psoriasis has 2 peaks of onset, the first at age 20 to 30 years and the second at age 50 to 60 years. It affects men and women equally but is more common in non-Hispanic whites. Psoriasis has no effect on life expectancy, but those who have it are more likely to develop diseases with a higher mortality risk, such as atherosclerosis, heart disease, and vascular disorders [3].

Worldwide million people approximately 2 to 3 percent of the total population have psoriasis, according to the World Psoriasis Day consortium [4]. The country most affected by psoriasis is Norway with a prevalence of 1.98% of the overall population [4]. The lowest prevalence is across East Asia at 0.12%. In general, prevalence rate of psoriasis varies from 0% to 11.8% among different populations, in India it varies from 0.44 to 2.8% [5].

There are reports across the world that individuals affected with inflammatory disorders loose vital minerals like chromium and magnesium through urine. Studies suggested that mineral bioavailability is particularly vulnerable to free radical damage, which has been found to be elevated during hyperglycemia [6,7]. Mineral loss may result in a

decrease in the body's mineral content, which may affect mineral concentrations such as zinc and magnesium [6-8]. Little knowledge is known to the scientific world regarding the status of zinc and magnesium in the people affected with psoriasis. Biomarkers found in this study could help people with psoriasis diagnosis and treat comorbid illnesses.

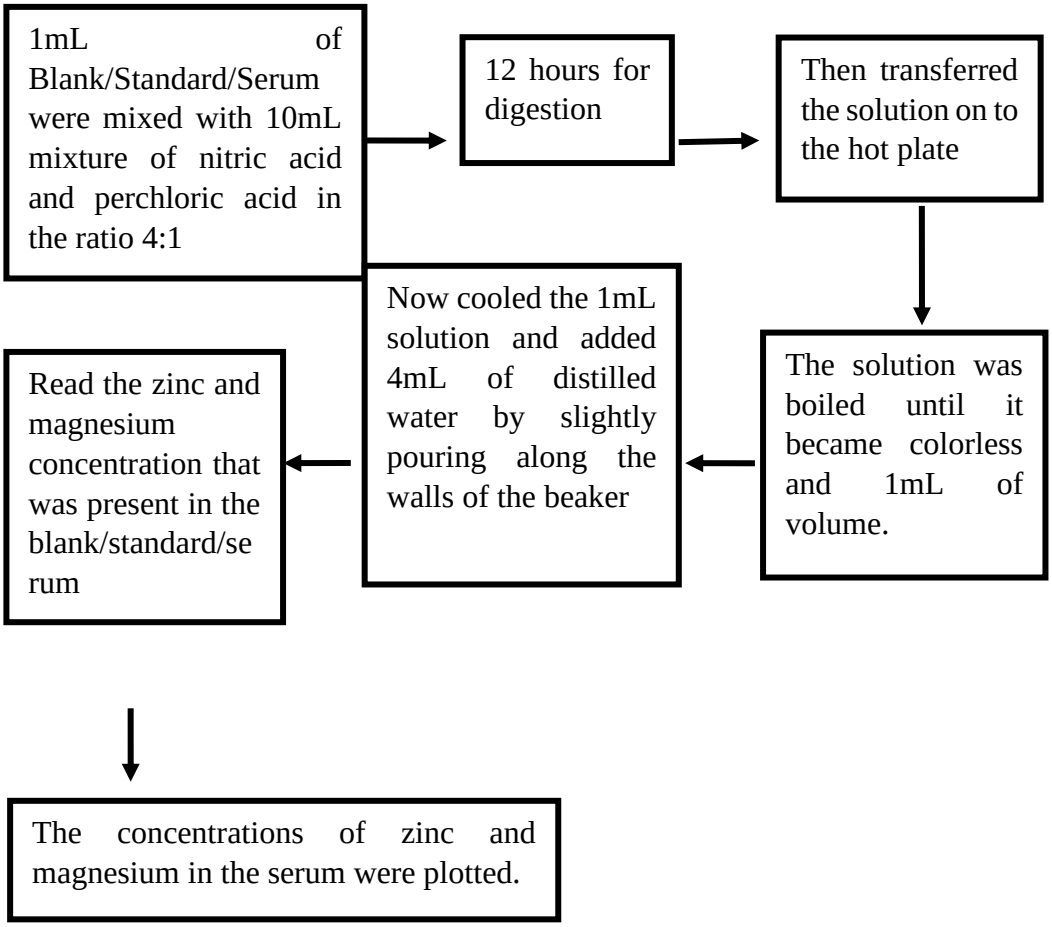
These results have the potential to help the broader public. People with autoimmune diseases like psoriasis are unlikely to find a natural treatment that is powerful enough to make up for the pathophysiological abnormalities that have developed. However, this hasn't been looked into much just yet. The aim of the present study is o compare and correlate the association of zinc, magnesium, and glycated hemoglobin in the individuals affected with psoriasis and the non-psoriasis controls.

Materials & methods:

Four hundred (400) individuals participated in the current study, divided evenly between the psoriasis group and the healthy control group. Utilizing the outpatient services of the Index Medical College and Research Center in Indore, examinations were conducted on each and every participant in both groups. After receiving green light from the institution's ethics board, the authors of the study proceeded with the project. All subjects provided informed consent prior to the start of this investigation. This permission was obtained prior to the start of the trial. A licensed medical expert working in the medicine department of the hospital where the research was conducted a comprehensive physical examination on all of the patients in both groups. This was carried out in strict conformity with predetermined procedures and with an eye toward predetermined inclusion and exclusion criteria. Inclusion criteria for healthy controls were non-psoriasis patients, not taking multivitamin supplementations, and having no other secondary pathologies. The control group consisted of individuals of the same age and gender who were assessed. Each patient was examined physically in line with the approved protocols and procedures by a licensed physician.

All members of the study group provided written consent before having 5 mL of venous blood collected from them into plane vials. Blood was centrifuged for 20 minutes at 3000 rpm to separate the serum, which was then frozen in aliquots at -20 degrees Celsius until analysis.

Zinc and magnesium standards: From the zinc and magnesium stock solutions (1000ppm), the calibration curve concentrations (50, 100, 150, 200, 250 µg/dL) and (0.50, 1.5, 2.5, 3.5 and 4.5 mmol/L) were freshly prepared by serial dilution respectively. The absorbencies of the samples were estimated by atomic absorption spectrophotometer. The absorbencies of the samples were compared with known reference standards.



The inter- and intra-assay CV were 2.8% and 4.1% for zinc and for magnesium it was 5.1 % and 5.8 %

The BioRad Diamat and Variant HbA1c analyzers were used with the ClinRep complete kit to measure HbA1c, and the test was done as directed. Normal values are 4.5-6.1%. The method of estimating lipid peroxidation that was established by Okhawa and colleagues in 1979 and known as the Thiobarbituric acid reducing substances (TBARS) method was utilized.

Statistical analysis:

For the purpose of carrying out statistical analysis, the most recent release of IBM SPSS was utilized. If you want to compare the means of the variables that come from two different groups, you should use the Unpaired t-test. The Pearson correlation was utilized so that we could determine the nature of the connection that existed between the two variables. The fact that the significance level is lower than 0.05 makes this finding statistically significant.

Results:

Table 1 shows the mean levels of serum zinc and magnesium in the psoriasis affected than non-psoriasis control subjects. The study observed lower levels of serum zinc and magnesium in the psoriasis affected than non-psoriasis subjects. In addition, the difference in the levels of zinc, magnesium, and MDA were statistically significant when compared between both the groups. On the other hand. The study observed statistical difference in the age variable when compared between psoriasis affected than non-psoriasis control subjects

Table 1: Age, serum zinc & magnesium levels in the study population

Variable	Psoriasis group (n=200)	Control group (n=200)	P Value
Age (years)	52.5±6.4	53.6±5.9	>0.05
Serum zinc (µg/dL)	98.8±25.2	132.3±18.7	**<0.05**
Serum magnesium (mg/dL)	0.7±0.3	1.8±0.4	**<0.05**
HbA1C (gm%)	7.1±2.1	5.8±1.1	**<0.05**
MDA (nmol/mL)	28.7±12.6	15.8±15.1	**<0.05**

Significant correlation between the parameters of the present study non-psoriasis (control) group:

In figure 1, we tried to find the association between the serum levels of zinc and MDA in healthy controls. We observed a negative association (y = -0.0247 + 27.236) between serum zinc and MDA; zinc and HbA1c (y = -0.05035x + 5.868) in non-psoriasis control group.

Figure 1: Scatter diagram showing relationship between zinc and MDA in control subjects

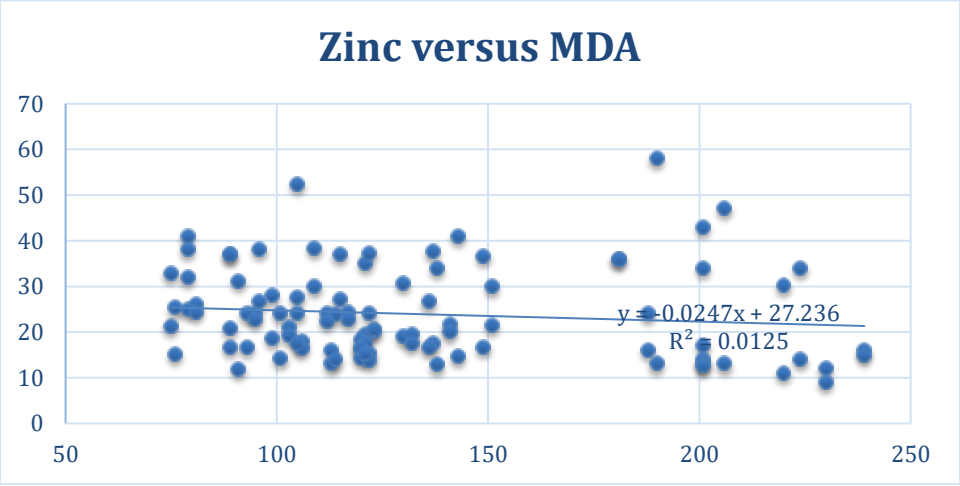
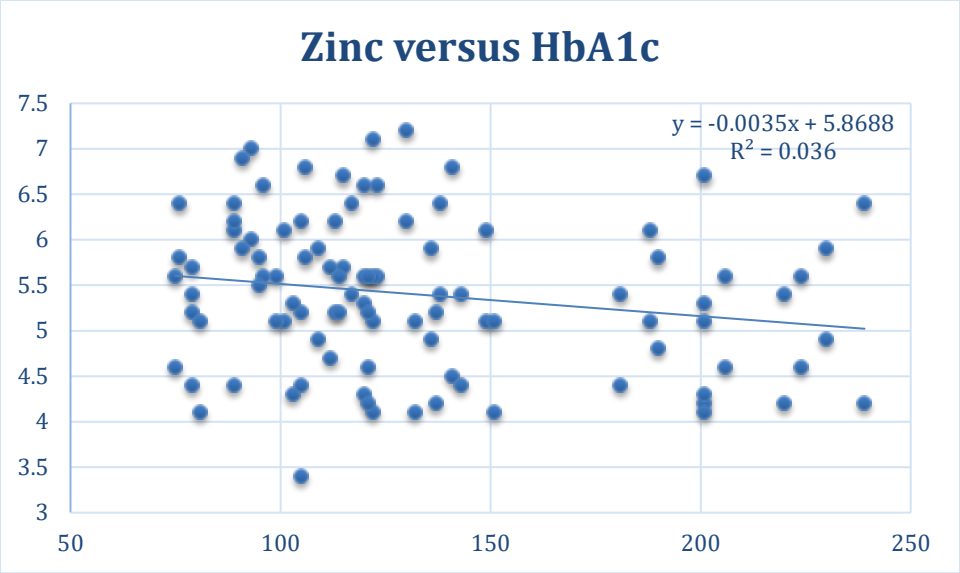


Figure 11: Scatter diagram showing relationship between zinc and glycated hemoglobin (HbA1c) in control subjects



Discussion:

The amount of minerals that are circulating in the blood is affected by a variety of factors, including age, obesity, sex, weight, nutrition, alcohol consumption, hormone levels, glycemic, and inflammatory diseases [9-13]. The researchers have also considered inflammation to be a potential cause of psoriasis [13]. They have made the assumption that zinc and magnesium, when present in concentrations that are physiological, will have an effect on the levels of biomolecule markers that are significant in the development of psoriasis [12,13].

In the current examination, it was discovered that zinc levels had decreased, which may have occurred as a consequence of the correction of biomolecular changes. On the other hand, it would indicate that an increase in MDA alone is not enough to trigger oxidative stress in psoriasis [14-16]. We noticed a favorable link between the levels of HbA1c and zinc in patients who did not have psoriasis when we compared their levels to one another. In addition, we discovered that a positive correlation existed between serum zinc and MDA as well as HbA1c in the control group. One of the most obvious impacts of oxidative stress is insulin resistance, and another is reduced glucose absorption. Lower zinc levels have been linked to insulin resistance in previous research [17-19], and the findings of this study confirmed those previous findings. There is a possible connection to the increase in oxidative stress as well as insulin resistance.

According to research carried out by Vasudevan et al. in 2010 [20-22], some enzymes that are involved in the glycolytic pathway require magnesium in the capacity of a cofactor [20, 21,24]. Magnesium was discovered to play a crucial role in enhancing insulin activity on the cell surface of insulin-dependent tissues, according to research done by [24]. According to a separate study. the absence of magnesium reduces the activity of the tyrosine kinase enzyme, which in turn slows down the pace at which glucose is transported into the cells [25]. Insulin receptor substrates have tyrosine residues in them, and tyrosine kinase is the enzyme that phosphorylates those residues [23.26]. A study found that the digestive tract plays a substantial part in the magnesium excretion process [27,28]. Magnesium is expelled from the body in the urine and feces if it is not absorbed by the body [20]. This includes magnesium that is contained in bile and intestinal secretions [20,28]. Research has shown that the kidneys are responsible for excreting a portion of the magnesium that the body has taken in [21,23].

It was discovered that the population of people with psoriasis had considerably lower serum magnesium levels as compared to the group of people who did not have psoriasis (the control group). The concentration of magnesium in persons who have psoriasis is a topic for which there is a paucity of information available on the internet. Magnesium

deficiency is common in people who suffer from psoriasis; however, the underlying reason of this deficiency is yet unknown. Psoriasis, according to the findings of this study, is a disorder that is defined by an increase in the rate at which skin cells are formed. This is the conclusion that we have drawn from the data of this study. In this regard, glucose is the primary cellular energy source, and magnesium is essential for the oxidation of glucose to supply energy for the proliferation of new cells. Magnesium also plays an important role in the production of ATP, which is the fuel that drives cellular metabolism. As a result, we can draw the conclusion that magnesium deficiency is caused by excessive consumption of magnesium stores and insufficient replenishment of magnesium reserves. Insulin resistance is another factor that contributes to low magnesium levels. Insulin sensitivity is necessary for magnesium re-absorption in the renal tubules, hence insulin resistance prevents this from happening. Changes in insulin action and insulin sensitivity are brought about by insufficient amounts of magnesium, which impede re-absorption in the renal tubules. However, there are research on the treatment of psoriatic patients that include the administration of magnesium salts [28,29]. In addition, it has been demonstrated that magnesium salts can help ease the symptoms of illness in some people [30-32]. Neither the clinical significance of magnesium in psoriasis nor an examination of its role in the disease at the cellular or molecular level have been investigated.

Conclusion:

The fact that persons with psoriasis have lower levels of zinc transporters than people who do not have psoriasis is the root cause of this imbalance. According to the findings of this study, there is a correlation between having psoriasis and having altered levels of zinc and magnesium levels in the body. If persons with psoriasis are able to identify and diagnose secondary conditions with the use of biomarkers discovered in this study, this could be beneficial.

Conflict of interest:

None declared.

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