e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(10); 1233-1237

Original Research Article

Analysis of Glycemic Profile, Zinc, Magnesium, and Lipid Peroxide Levels in Psoriasis Patients

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Received: 25-07-2023 / Revised: 28-08-2023 / Accepted: 30-09-2023
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Conflict of interest: Nil

Abstract:

Background: It is quite improbable that sufferers of autoimmune disorders such as psoriasis would come across a natural therapy that is effective enough to compensate for the pathophysiological anomalies that have arisen as a result of their condition.

Aim: Comparing and correlating the connection of glycemic profile, zinc, magnesium, and lipid peroxides in people affected with psoriasis and those who do not have psoriasis will be the focus of the current study.

Materials & Methods: A total of one hundred (100) volunteers were chosen at random to be divided into two groups: those with psoriasis and those without the disease. All of the participants in both groups underwent examinations through the utilization of the outpatient services. The university's ethics board gave the researchers permission to proceed, and they did so with the writing of the article.

Results: The study's conclusions showed that blood zinc and magnesium levels were lower in psoriasis patients than in non-psoriasis individuals. Zinc, magnesium, and malondialdehyde (MDA) levels were also different amongst the groups. This difference was statistically significant. In point of fact, the opposite is true. When the researchers compared the age variable of psoriasis patients to that of control people without the skin disease, they found a statistically significant difference.

Conclusion: The fundamental cause of this mismatch is that psoriasis sufferers have lower concentrations of zinc transporters than non-psoriasis sufferers. Psoriasis appears to be linked to changed zinc and magnesium levels in the body, according to the findings of this analysis, which indicates a linkage between the two. It was demonstrated that there is a connection between psoriasis sufferers and healthy controls.

Keywords: Psoriasis; Zinc; Magnesium; Malondialdehyde; Glycemic profile; Skin disease.

Introduction

The development of scaly, itchy rashes on a patient's head, back, elbows, and knees is a hallmark of psoriasis. One chronic skin condition that affects a large number of people is psoriasis. It could not feel comfortable, and it might be hard to focus and fall asleep [1-3]. A person may get psoriasis at any point in their lifetime. There are two peaks in the start of psoriasis: the first one appears between the ages of 20 and 30, and the second one appears between 50 and 60.

Males and females are equally affected, however non-Hispanic white people are more likely to receive a diagnosis for it. Psoriasis does not shorten a person's life span, but it can increase the likelihood of developing conditions including atherosclerosis, cardiovascular disease, and vascular diseases, which are associated with a higher death risk [3]. About 2 to 3 percent of people worldwide suffer with psoriasis; Norway has the highest frequency, with 1.98% of the population affected [3]. According to the consortium that organizes World Psoriasis Day, the prevalence of psoriasis is highest in Norway. East Asia has the lowest incidence rate in the world, at 0.12%. Depending on the demographic category, prevalence rates of psoriasis can vary from 0% to 11.8%; in India, they can range from 0.44 to 2.8% [4]. Global research is beginning to show that people with inflammatory diseases lose important minerals like magnesium and chromium through their urine.

It would seem that free radicals, whose abundance is shown to increase during hyperglycemia, are particularly dangerous to mineral bioavailability [6, 7]. The body's mineral content may drop as a result of mineral loss, which may impact the concentration of minerals like magnesium and zinc [6–8]. The levels of zinc and magnesium in psoriasis patients are poorly understood by the scientific community. The biomarkers identified in

this study may have use in the identification and treatment of coexisting medical conditions in people with psoriasis.

In the long term, these findings could be advantageous to the entire population. It is quite unlikely that individuals with autoimmune diseases, like psoriasis, would discover a natural remedy potent enough to offset the pathophysiological anomalies that have arisen from their illness. Even still, this hasn't received much notice up until this point. In the current study, participants with and without psoriasis will have their lipid peroxide levels, zinc levels, magnesium levels, and glycemic profiles compared and correlated with one another.

Materials & Methods

There were one hundred (100) participants in the current study, with the same number of individuals allocated to each of the two groups: those with psoriasis and those without the condition. All of the participants in both groups underwent examinations through the utilization of the outpatient services. The university's ethics board gave the researchers permission to proceed, and they did so with the writing of the article. After learning enough, each participant granted consent before this investigation started. Obtaining this approval before to beginning the experiment was a fruitful endeavor, and it was successful. Each patient in both groups underwent a detailed physical examination that was performed by a doctor or other qualified medical professional who worked in the hospital's medical department and held a valid license to practice medicine. This was done with careful attention to the intended inclusion and exclusion criteria as well as strict adherence to the prescribed techniques. The individuals in the healthy control group did not use multivitamin supplements, did not have secondary ailments, and did not have psoriasis. These were the requirements for inclusion. The control group consisted of individuals who were chosen from the general public who were the same age and gender. Every patient had a thorough physical examination from a licensed medical professional who made sure everything followed the guidelines.

Prior to the extraction of 5 milliliters of venous blood into single-use vials, every research study participant provided written consent for the process. The serum was separated from the blood by centrifuging it for twenty minutes at 3,000 revolutions per minute. The serum was then kept in aliquots and kept at minus twenty degrees Celsius until analysis. The Glucose Oxidase and Peroxidase (DPEC – GOD/POD) technique was utilized in order to ascertain the glucose concentration present in the plasma. This method was made available by Avantor Labs. The quantity of the target that is bound between two antibody pairs in a solid-phase sandwich ELISA (enzyme-linked immunosorbent test) for human insulin quantifies the amount of the target that is bound. In accordance with the recommendations that were provided, the HbA1c level was determined by employing the ClinRep full kit in conjunction with the BioRad Diamat and Variant HbA1c analyzers. Normal values fall between 4.5 percent and 6.1%. The approach proposed by Muniyappa and colleagues (2008) was utilized to compute the HOMA-IR. In 1979, Okhawa et al. established the Thiobarbituric acid reducing substances (TBARS) approach to estimate lipid peroxidation. This method is still applied today. To find the amount of IL-4 cytokine in the blood, an analyte Elisarray reagent created by Qiagen laboratories was utilized. The guidelines given in the handbook were followed throughout the reagent manufacture process.

The following apply to magnesium and zinc: Starting with the stock solutions of zinc and magnesium at a concentration of 1000 ppm, the calibration curve concentrations of zinc (50, 100, 150, 200, and 250 µg/dL) and magnesium (0.50, 1.5, 2.5, 3.5, and 4.5 mmol/L) were freshly created by serial dilution, respectively. For every sample, the absorbency was measured using an atomic absorption spectrophotometer. The samples' absorbencies were assessed in this experiment and contrasted with pre-established reference standards. Zinc had a CV of 3.8% and 6.2% across tests, whereas magnesium had a CV of 4.9% and 6.4%.

The ClinRep complete kit, the BioRad Diamat, and the BioRad Variant HbA1c analyzers were used to determine HbA1c levels. The results were interpreted in accordance with the criteria that were supplied. Normal values fall between 4.5 and 6.1%. To estimate lipid peroxidation, the Thiobarbituric acid reducing substances (TBARS) approach was used. The lipid peroxidation method, which was created by Okhawa and associates in 1979, is the name given to this technique.

Statistical Analysis

The latest iteration of IBM SPSS was utilized to ensure statistical analysis was conducted in accordance with its intended purpose. When comparing the means of variables that come from two different groups, the Unpaired t-test should be used since it allows for the elimination of any potential bias. We performed a statistical study utilizing the Pearson correlation to learn more about the link between the two variables. Because of this, we were able to zero down on the precise nature of the relationship between the two factors. This result is considered to have statistical significance since the significance criterion is more than 0.05 but less than 0, making the difference between the two.

Results

In Table 1, the results for each group are broken down based on the homeostasis model assessment

of insulin resistance (HOMA-IR), glycated hemoglobin, insulin levels, and blood sugar levels. In terms of mean levels of insulin (t=12.43; df=98; P 0.05), fasting blood sugar (t=24.13; df=98; P 0.001), and HbA1c (t=18.4; df=98; P 0.001), there is a statistically significant difference between the two groups. After eating, the average blood glucose level in the psoriasis group is 135 mg/dL, while it is 118.4 mg/dL in the control group. This is a noteworthy distinction. Participants with psoriasis had a HOMA-IR that was around 0.5 percentage points greater than the controls. We were able to do the computations required to determine percentage increases by merging the demographic data of individuals of the same age and gender who belonged to both groups of respondents. Additionally, we computed the HOMA-IR to have a better understanding of the variation in IR intensity between the two groups.

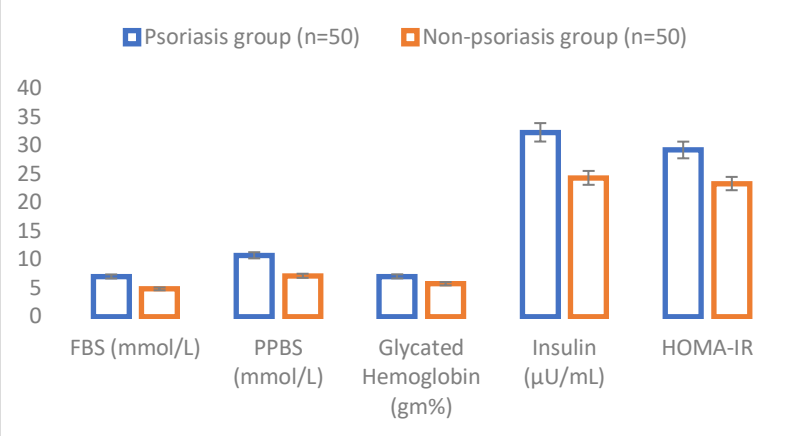

Figure 1: Glycemic profile in the study population

Figure 1 displays the study's findings on the mean blood levels of magnesium and zinc in control individuals without psoriasis and patients with psoriasis. The findings of the study indicated that people with psoriasis had lower amounts of zinc and magnesium in their blood than persons who did not suffer from psoriasis. In addition, there was a difference in the levels of zinc, magnesium, and MDA in each of the two groups when compared to one another. This difference was statistically significant.

In point of fact, the opposite is true. When the researchers compared the age variable of psoriasis patients to that of control people without skin disease, they found a statistically significant difference.

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

Variable	Psoriasis group (n=50)	Control group (n=50)	P Value
Age (years)	48.8 ± 7.2	49.4 ± 8.1	>0.05
Serum zinc (µg/dL)	90.1 ± 18.9	118.3 ± 9.8	<0.05
Serum magnesium (mg/dL)	0.9 ± 0.1	3.9 ± 0.8	<0.05
MDA (nmol/mL)	39.6 ± 17.2	23.4 ± 8.4	<0.05

Discussion

Numerous factors affect the total mineral content of the blood, including age, obesity, sex, weight, food, alcohol use, hormone levels, glycemic and inflammatory diseases, and many others [6-9]. The results of the study raise the hypothesis that inflammation is a contributor to the onset of psoriasis [10]. Researchers expected that biomarker levels important in psoriasis development would be influenced by physiologically adequate amounts of magnesium and zinc [9-11]. A lower zinc level was seen in the most recent study, which may have resulted from biomolecular alterations being fixed. The results of the earlier investigation allowed for the possibility of this conclusion. However, this would imply that oxidative stress in psoriasis cannot be caused by an increase in MDA alone [12–21]. After analyzing the blood samples of those without psoriasis, we found a positive correlation between the levels of zinc and HbA1c. In addition, we found that there was a strong association between MDA and serum zinc as well as HbA1c in the group that served as the control. One of the most noticeable effects of oxidative stress is insulin resistance. The amount of glucose absorbed is decreased as a result of insulin resistance. Previous research has connected low zinc levels to insulin resistance [12–21]. The results of the current study corroborate those findings. There exists a potential correlation between high oxidative stress levels and insulin resistance.

According to one research, for a variety of enzymes involved in the glycolytic process to function correctly, magnesium must be present as a cofactor.

Magnesium also contributes significantly to the process of increasing insulin action on insulin-dependent tissues' cell surfaces. Another study [25] found that the rate at which glucose enters cells was slowed due to a shortage of magnesium via inhibiting the activity of the tyrosine kinase enzyme. It is the job of the enzyme known as tyrosine kinase to phosphorylate tyrosine residues, which are frequently located in insulin receptor substrates [23, 26]. One piece of research found that the digestive tract has a considerable impact on the total quantity of magnesium that is expelled from the body [27]. If the body is unable to absorb magnesium, it will leave the body through the urine and the feces [20]. Magnesium is a mineral that helps keep bones and muscles healthy. As an illustration, magnesium could be present in bile and the secretions that are produced by the intestines [20, 27]. According to the findings of a number of studies [22–27], the kidneys are the organs that are responsible for excreting some of the magnesium that the body has taken in.

When compared to the population that was diagnosed with psoriasis (referred to as the disease group), the control group of people had significantly higher amounts of magnesium in their serum. There isn't a lot of information on the magnesium levels in people who suffer from psoriasis that can be found on the internet. Patients who suffer from psoriasis are more likely to have a magnesium deficit, although the underlying cause of this deficiency is still not fully understood. According to the findings of this study, psoriasis may be diagnosed when the body's natural rate of skin cell synthesis accelerates beyond a healthy range. We arrived at this conclusion after carefully reviewing the study's results. Magnesium is required for the oxidation of glucose, releasing energy that may be utilized for cellular renewal, suggesting that glucose is the major source of cellular energy. Furthermore, magnesium is required for the synthesis of ATP, the cellular fuel that powers cellular metabolism. This leads us to the conclusion that both excessive magnesium consumption and insufficient magnesium replenishment are the causes of magnesium shortage. Low magnesium levels in the body can also be caused by insulin resistance. Since magnesium needs insulin sensitivity, which insulin resistance prevents, it is not possible for magnesium to be reabsorbed in the renal tubules. Insufficient magnesium leads to a disturbance in the renal tubules' re-absorption process, hence altering the sensitivity and action of insulin. However, studies have been conducted on the application of magnesium salts in the management of psoriatic illness [22–27]. Furthermore, research [22–27] suggests that using magnesium salts may provide some individuals with relief from their illness's symptoms. There has been no research done on the clinical significance of magnesium in psoriasis, nor on the molecular or cellular role that magnesium plays in illness.

Conclusion

The reason for the discrepancy is that psoriasis patients have less zinc transporters in their bodies than do healthy individuals. Psoriasis appears to be linked to higher magnesium levels in the body and lower zinc levels, according to the findings of this research study. The study may have been effective if the biomarkers it discovered can be used to help psoriasis sufferers identify and diagnose additional conditions.

Conflict of interest: None declared.

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