Original Article

PCOS In Females is independent of Ferritin and Minerals Levels

Hiba Resheed Behayaa[1], Zinah Abbass Ali[2], Khawla A. Shemran[3]
[1,2,3]Dept. of Clinical Biochemistry, College of Medicine, University of Babylon, Hilla, Iraq.
Email: hiba_resheed80@yahoo.com

Abstract

Females of reproductive age may be affected by a complex endocrine disorder called, Polycystic Ovary Syndrome (PCOS). One of the intracellular proteins is Ferritin, have a role in regulating iron homeostasis. This study was planned to investigate the association between serum ferritin levels with blood calcium levels and some other minerals in Iraqi females with PCOS. Ferritin and some minerals were measured in sixteen Iraqi patients with PCOS. The level of ferritin was assessed in serum by ELISA technique. The level of serum ferritin displayed normal value in patients. Among patients with PCOS, the level of ferritin revealed a non-significant relationship with calcium in the disease. The study concludes that among polycystic ovarian patients, ferritin concentrations are independent of age, BMI, waist/ hip ratio, serum potassium, and ionized serum calcium which may point out that the exact reason for PCOS is still unidentified.

Keywords: Polycystic Ovary syndrome, Ferritin, Minerals, Calcium, Relationship.

Introduction

The most communal endocrinopathy in females of reproductive age (15–44 years) is Polycystic ovary syndrome (PCOS), with an incidence of 5–10% (1). Polycystic ovary syndrome influences numerous systems and have several complications like irregular menses, infertility, insulin resistance, acanthosis nigricans, hir¬sutism, and obesity. As well, elevated blood pressure, heart disease, and type II diabetes are considered long-term consequences (2).

Newly, genetic and environmental factors are important risk factors for PCOS. So, revealing the basic pathophysiology and fined the suitable treatment for PCOS is a real di¬lemma for gynecologists and endocrinologists (2).

Ferritin in serum is vital for maintaining the level of iron and is a noninvasive pointer to the status of total body iron. Patients with renal disease, disorders in the immune system, cardiovascular disease, inflammation, and metabolic diseases have higher ferritin levels in serum. Furthermore, several studies observed a higher level of ferritin in serum women with PCOS (3).

Access this article online

Quick Response Code:

Website: www.pnrjournal.com

DOI: 10.47750/pnr.2022.13.03.023

There is plenty of indication that minerals are vital for female reproductive function. Actually, hormone management, ovulation, and metabolism can be associated with minerals. Over 60 minerals in several quantities are present in human cells. Each one of these minerals has a significant role in several biological functions. Minerals are the constituent of enzymes or coenzymes that controlled several metabolic reactions and serve as components or managers of different functions in body cells. Consequently, the greatest revisions on minerals and reproductive hormones, depend on minerals concentrations in human serum or in animal models (4).

Address for correspondence: Hiba Resheed Behayaa,
College of Medicine, University of Babylon, Hilla, Iraq.
Email: hiba_resheed80@yahoo.com

How to cite this article: Hiba Resheed Behayaa, Zinah Abbass Ali, Khawla A. Shemran, PCOS In Females is independent of Ferritin and Minerals Levels, J PHARM NEGATIVE RESULTS 2022;13:148-150.

There are ideas that activation and maturation of oocyte in animals are affected by calcium; hence, calcium metabolism abnormalities may show a central role in the etiology of PCOS. Hence, this work was designated to assess the level of ferritin and investigates its association with calcium and other minerals in females with PCOS.

This study was designated as a cross-sectional study. Sixteen Iraqi females with PCOS participated in this revision. Complete history from all patients was taken, which comprised age, residence, duration of ministration, number of children, miscarriage, and the history of latest ministration. The age of patients from 22 to 36 years. This study was agreed upon based on the local ethics group, all females who participated in the study give an idea about the aim of the study, agree, and signed the agreement informed. The study protocol and the patient's consent forms were reviewed and approved by the committee on publication ethics at College of Medicine, University of Babylon, Iraq, under reference No. BMS/0382/016.

Serum ferritin concentration was determined by the sandwich-ELIZA kit. In this kit, a monoclonal antibody specific to ferritin was pre-coated to the micro- ELIZA plate, while calcium, potassium, sodium, and chloride levels were examined by the ion selective electrode method using Automated Electrolyte Analyzer GE300 (Genrui Biotech Inc., China).

Statistical analysis was carried out using SPSS version 25.0 (SPSS, IBM Company, Chicago, IL 60606, USA). Mean ± SD was used for the expression of the result, and P values less than 0.05 was reflected in a significant result.

Results

The results revealed that the variance in age, waist to hip ratio, and body mass index (BMI) as (mean ± standard deviation SD) with the range are demonstrated in (Table 1). Regarding the biochemical parameters measured in women with PCOS, the results of serum concentrations of ferritin and other minerals in patients with PCOS as [(median) Range] with normal range are demonstrated in (Table 2). A positive relationship was detected between ferritin level in serum and the level of serum sodium, serum chloride concentration respectively ($r = 0.629$, $p = 0.009$), ($r = 0.604$, $p = 0.013$) in PCOS patients. As well, there were no relationships observed among ferritin concentration in serum and age, BMI, waist to hip ratio, serum potassium, serum ionized, and total calcium in PCOS women, (all $p > 0.05$) (Table-3).

Table (1): The characteristics of women with PCOS

Characteristic	Range	Value Mean± SD
Age (years)	22-36	27.37 ± 3.68
BMI (Kg/m^2)	21.9-35.3	27.944 ± 4.303
Waist/ hip ratio	0.7- 1.05	0.886 ± 0.088

BMI= body mass index

Table (2): The study sample characteristics

Parameters	Normal range	Value (median) Range
Ferritin (ng/ ml)	12-150	(22.09) 10.5-55.13
Serum i Ca (mg/dl)	4.4-5.21	(3.38) 2.6-4.2
Serum T Ca (mg/dl)	8.41-11.62	(6.59) 5.07-8.19
Serum Na (mg/dl)	310.3-340.2	(309.05) 291-327.3
Serum Cl (mg/dl)	347.4-389.9	(353.95) 325.8-381.8
Serum K (mg/dl)	13.68-20.72	(16.98) 13.56-21.58

iCa = ionized calcium, T Ca = total calcium, Cl= chloride, Na= sodium, K=potassium

Table (3): Correlation between Ferritin and biochemical parameters among PCOS patients

Parameters	Ferritin concentration in serum of PCOS patients (n=16)
Age	r=0.114 , p=0.675
BMI (Kg/m^2)	r=0.24 , p=0.371
Waist/ hip ratio	r= 0.26 , p= 0.331
Serum i Ca	r=0.267 , p= 0.317
Serum T Ca	r= 0.267 , p= 0.317
Serum Na	r=0.629 , p= 0.009
Serum Cl	r=0.604 , p=0.013
Serum K	r=0.13 , p=0.631

iCa = ionized calcium, T Ca = total calcium, Cl= chloride, Na= sodium, K=potassium

Discussion

PCOS is a communal illness considered by hyperandrogenism, impaired ovulation, and distinctive changes in the ovaries. Likewise, overweight or obesity is the characteristic in around 50% of PCOS females (5). This fact was in harmony with the findings of this study. The range of BMI of subjects (who were recognized as PCOS patients) was (21.9-35.3). This variance may be due to the differences in culture and food habits of the study population. Also, the age of PCOS women recruited in this study was between 22-36 years.

Iron homeostasis is regulated by an intracellular protein, Ferritin (3). Also, insulin resistance and abdominal obesity are associated with an increase in serum ferritin. Martínez-García et al (6) revealed that elevated androgens levels and disorder in menstruation are linked with ferritin concentration.

This study found that serum ferritin concentration did not appear to change in women with PCOS. Our results were incompatible with Barartabar et al (1) who revealed that ferritin levels in serum were elevated in PCOS women and PCOS women with obesity.

Pokorska et al (4) demonstrated that the role of macro and micronutrients in the incident of PCOS is unidentified but, Animal researchers established that calcium function in oocyte activation and maturation and theorized that troubles in maintaining calcium levels may be the risk factor for PCOS (2).

As shown in Table 2, total and ionized serum calcium levels were decreased in women with PCOS. This outcome was consistent with the result obtained by Grossi et al (7) who found a low level of serum calcium when estrogens level is increased among women with PCOS.

Although this study observe a slightly decreased in the concentration of serum sodium, chloride, and potassium in PCOS women. This result was incompatible with the results obtained by Pokorska-Niewiada et al (4) who observed a statistically insignificant elevation in potassium and sodium level in PCOS women.

As shown in (Table 3), the correlation between plasma level of ferritin with age, BMI, Waist/ hip ratio, serum potassium, total-and ionize serum calcium in patients with PCOS observed a non-significant (p-value >0.05) correlation, while serum ferritin is significantly correlated with serum sodium and serum chloride.

A research has focused on the association of human health with micro and macro-elements, Benaglia et al (8) found that many reproductive illnesses like, repeated miscarriages, infertility, and cancer are linked with disturbances in elements metabolism. Thus, there is no adequate data on levels of minerals in PCOS women. There is only limited research about micro and macro-elements level cells of the blood. Greatest of the these studies about minerals in the serum, does not appear to be the correct line (4).

In fact, the main reason for PCOS is still unidentified, but women with PCOS are characterized by elevated serum ferritin levels, micro and macro-elements are one of the etiology of PCOS. Abnormality in mineral levels may act as an indicator of this disease (9).

Conclusion

In conclusion, our data contribute to the accumulating evidence that ferritin concentrations among polycystic ovarian patients are independent of age, BMI, waist/ hip ratio, serum potassium, total-and ionize serum calcium which may point out that the exact reason for PCOS is still unidentified.

Interest Conflicts

None interest conflicts.

Funding source

None

References

1. Barartabar Z, Danesh H, Mazloomi S, Alizadeh N, Pilehvari SH. Association of High Levels of Testosterone and Ferritin with Overweight in Women with PCOS. Journal of Advanced Biomedical Sciences 2021; 12: 3886-92.
2. Moini A, Shirzad N, Ahmadzadeh M, Hosseini R, Hosseini L, Sadatmahalleh SJ. Comparison of 25-hydroxyvitamin D and Calcium Levels between Polycystic Ovarian Syndrome and Normal Women. Royan Institute International Journal of Fertility and Sterility, 2015; 9: 1-8.
3. Adamska A, Łebkowska A, Krentowska A, Adamski M, Kowalska I. The Association Between Serum Ferritin Concentration and Visceral Adiposity Estimated by Whole-Body DXA Scan in Women With Polycystic Ovary Syndrome. Frontiers in Endocrinology, 2020;10: 873.
4. Pokorska-Niewiada K, Brodowska A, Szczuko M. The Content of Minerals in the PCOS Group and the Correlation with the Parameters of Metabolism. Nutrients. 2021;13(7): 2214.
5. Glueck CJ, Goldenberg N. Characteristics of obesity in polycystic ovary syndrome: etiology, treatment, and genetics. Metabolism. 2018; 92: 108-20.
6. Martínez-García MÁ, Luque-Ramírez M, San-Millán JL, Escobar-Morreale HF. Body iron stores and glucose intolerance in premenopausal women: role of hyperandrogenism, insulin resistance, and genomicvariants related to inflammation, oxidative stress, and iron metabolism. Diabetes care, 2009; 32: 1525-30.
7. Grossi E, Castiglioni S, Moscheni C, Antonazzo P, Cetin I, Savasi VM. Serum magnesium and calcium levels in infertile women during a cycle of reproductive assistance. Magnes. Res., 2017; 30: 35-41.
8. Benaglia L, Paffoni A, Mangiarini A, Restelli L, Bettinardi N, Somigliana E, et al. Intra-follicular iron and ferritin in women with ovarian endometriomas. Acta Obstet. Gynecol. Scand. 2015; 94:646-53.
9. Jamilian M, Maktabi M, Asemi Z. A trial on the effects of magnesium-zinc-calcium-vitamin D co-supplementation on glycemic control and markers of cardio-metabolic risk in women with polycystic ovary syndrome. Arch. Iran. Med. 2017; 20: 640-45.