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Role of Oxidative Strees and Antioxidants in Obese and Non-Obese Womans with Polycystic Ovary Syndrome

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ABSTRACT

The study was conducted on (90) blood samples, 60 samples from patients with (PCOS) and 30 of them were healthy women. Blood samples were collected from women attending outpatient clinics in Kirkuk Governorate, after their diagnosis. By obstetrics and gynecologists for the period from 11/20/2021 to 25/2/2022, as their ages ranged between (17-42) years, and they were divided into three groups depending on the body mass index (BMI), the first group (30) samples for patients with (PCOS) who are obese with BMI of more than 30 kg/m^2 , and second group (30) samples for ladies without obesity who have polycystic ovary syndrome with a BMI of less than 25 kg / m^2 and the third group (30) samples of non-infected women with a BMI of more than 30 kg / m^2 as a control group. The study included the measurement of antioxidants, including non-enzymatic antioxidants It includes (glutathione, uric acid, and bilirubin), as well as measuring the concentration of malondialdehyde in obese, and without obesity (PCOS).

The findings of this research show following:

* Increase that is statistically significant (P ≤0.01) in the concentration malondialdehyde when comparing obese women with PCOS with control, and increase that is statistically significant (P ≤0.05) when comparing between PCOS-afflicted obese and non-obese women

* A notable reduction in the p-valu (P≤0.01) in the (bilirubin and glutathione) of concentration when comparing obese PCOS patients with control, a notable reduction and at the level of probability (P≤0.01) in the concentration of bilirubin and (P≤0.05) in the concentration of glutathione at Comparing obese women with PCOS to non-obese patients.

* A notable reduction (P≤0.05) in the total capacity of antioxidants in obese women with PCOS compared with the control group, the results showed decrease that is statistically significant (P ≤0.01) when comparing the concentration of the total capacity of antioxidants between women Obese and non-obese patients.

* A non-significant differences in uric acid concentration when comparing women with PCOS with control, and the results showed a increase that is statistically significant (P ≤0.05) when comparing women with PCOS who are obese with those who are not obese.

ARTICLE DETAILS

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1- INTRODUCTION

Polycystic ovary syndrome is one of the complex diseases that are clinically heterogeneous heterogenous condition, as it affects a large proportion of women of childbearing age by up to 30% [(1)]. It is a major cause of infertility, and there are differences in the signs and characteristics of this syndrome, as it not only affects the reproductive health of women, but also affects the metabolic processes and cardiovascular systems, and there are differing opinions about how to define and diagnose PCOS as well as the different types of treatment options in all All over the world [(2)], while the other opinion referred to the role of insulin in increasing the male hormones, especially testosterone, resulting from the presence of insulin resistance.

The research of Deepika and his group (2014)[(3)] also found that oxidative stress (OS) plays a significant role in enhancing insulin resistance and increasing androgens, which in turn raises indicators of PCOS. Polycystic ovary syndrome is characterized by several clinical symptoms, including high levels of androgens, amenorrhea or lack of ovulation, the appearance of acne on the face, hirsutism and weight gain [(4)]

1.1- Objectives of the study

The study aims to:

1- Investigating the level of antioxidants, including the level of total antioxidants, glutathione concentration, total billirubin concentration, and uric acid concentration.

2- Studying indicators of oxidative stress, including malondialdehyde.

2- MATERIALS AND METHODS

2.1- The Sample of the study

Blood specimen (90) were collected, 60 blood samples from women with polycystic ovary syndrome and 30 blood samples from healthy women between the ages of (17-42) years from outpatient clinics for the period from 11/20/2021 to 25/2/2022. These samples were obtained by taking five milliliters (ml) of venous blood from the (2^{nd}-3^{rd}) day of their menstrual cycle after confirming that they have Polycystic Ovary Syndrome and putting the blood directly into Gel tubes and leaving it for (20) minutes at room temperature for the purpose of blood clotting.

After that it was spun at 3000 revolutions per minute for ten minutes in a centrifuge and the blood serum free of red blood cells was separated, and the serum was frozen after its fractionation in several test tubes (Appendroff tubes 1.5 ml) to perform the required biochemical tests.

2.2-Measuring the level of total antioxidant capacity in blood serum

This was based on the FARP method, ,Which is an easy way to calculate the capacity of antioxidant power that reduces ferric tripyridy triazine complex [Fe(III)-TPTZ] to [Fe(II)-TPTZ] ferrous tripyridy triazine of intense blue color absorbed at wavelength 593 nm .FRAP values are calculated by comparing the absorption change in the reaction mix test with those containing Fe(II) ions in known concentrations [(5)]

2.3- Measuring of malondialdehyde level in blood serum

Malondialdehyde is a measurement of lipid peroxide through the reaction of thiobarbituric acid-TBA with MDA [(6)] . e TBA reacts with MDA under conditions of temperature and low pH, where the reaction occurs in acidic medium to from the pink color of complex [TBA] 2-malondialdehyde. The absorbance was measured at a wavelength of 532 nm.this is consistent with the percenttage of lipid peroxide in the sample.

2.4-Measuring of glutathione concentration in blood serum

Glutathione was estimated in blood serum using the modified method (Sadlak & Lindsay) [(7)] , as this method is based on the use of Elmans reagents that contain (DTNB) (5,5-Dithio bis 2-Nitrobenzoic acid), which reacts quickly With glutathione and reduced by the sulfhydryl group (SH group) of glutathione to produce a yellow compound whose absorption intensity is measured at wavelength (412 nm), as the concentration of the product formed depends on the concentration of glutathione in the blood serum.

2.5- Measuring of uric acid concentration in blood serum

The concentration of uric acid in blood serum was estimated using the diagnostic kit prepared by the French company (Biolabo), as uric acid is the final product of purine metabolism, where Uricase catalyzes the oxidation of uric acid to allantoin and H_2O_2 in the presence of the enzyme peroxidase and that H_2O_2 interacts with the chromogen, which is 4-Amino-antipyrine and 3,5-Dichloro-2-Hydroxybenzene Sulphonate form a red Quinoneimine complex [(8)].

2.6-Measuring of bilirubin concentration in blood serum

The amount of total bilirubin was measured after its interaction with the reagent diazotized sulphanilic acid, which leads to the formation of an azobilirubin compound, colored in a very acidic or basic medium [(9)]

3- RESULTS AND DISCUSSION

Values of malondialdehyde, total antioxidant capacity level and glutathione , uric acid concentrations were measured in the serum of obese and non-obese PCOS patients compared to the control group. The results are shown in Table (1).

Table (1) The average index of oxidative stress and total antioxidants in the two groups of infected women and the control group.

Groups Parmerter	Patients Obesity and Control Mean±SD			Patients Obesity and Non obesity Mean±SD		
	Control n=(30)	Patients Obesity n=(30)	p-value	Patients Obesity n=(30)	Patients Non obesity n=(30)	p-value
MDA (nmol/ml)	4.23± 1.76	9.45±2.78	0.01	9.45±2.78	7.39±2.94	0.05
GSH (mmol/L)	35.42±8.15	28.25±5.7	0.01	28.25±5.7	30.56±3.15	0.05
TSB (mg/dl)	0.61±0.14	0.56±0.13	0.01	0.56±0.13	0.54±0.12	0.01

Uric acid (mg/dl)	3.92±1.23	4.25±1.3	Ns	4.25±1.3	3.59±1.11	0.05
TAC (mmol/L)	0.32±0.14	0.31±0.11	0.05	0.31±0.11	0.33±0.11	0.01

3.1- concentration of malondialdehyde

Table (1) shows that the concentration of malondialdehyde increased significantly at the level of probability (p≤0.01) in the group of obese women with PCOS compared to healthy group, and the results in the same table also showed a significant increase at the p-value (P≤0.05) in the concentration of MDA in Obese women more than non-obese.

The results of this study agree with the results of the study of Zimmer and his group [(10)] , who indicated an increase in the level of malondialdehyde resulting from an increase in the lipid peroxidation process of unsaturated fatty acids of different cells, including egg cells, as a result of an increase in the active types of oxygen and nitrogen of various types, and this increase gives an indication It is clear that the state of oxidative stress occurs in women with polycystic ovary syndrome, since the MDA value is one of the indicators of the occurrence of oxidation within the body resulting from the process of lipid peroxidation of fatty acids, Rasool and his group [(11)], also agreed with the results, as they indicated that there was a rise in the concentration of MDA in women with PCOS compared to the control, and Uçkan [(12)] also indicated that there was a rise in the concentration of MDA in obese women more than in non-obese women.

3.2- Glutathione concentration in blood serum

Table (1) showed a significant decrease in glutathione concentration at a p-valu (P≤0.01) when obese PCOS patients were compared with healthy group, and also showed table (1) a significant decrease in GSH concentration at a probability level (P≤0.05).) When comparing obese PCOS patients with non-obese patients, the reason for the low concentration of glutathione in women with polycystic ovary syndrome is due to the increase in the levels of free radicals and their accumulation in the body, which leads to an increase in oxidative stress, as the increase in free radicals leads to an increase in malondialdehyde, which works to The breakdown and consumption of antioxidants, including glutathione, so their levels decrease, and these results are consistent with the results of the studyLuberda and his group [(13)] , as well as Zuelke [(14)] and his group indicated that the glutathione enzyme participates in the removal of oxidation directly through the thiol group that it contains in its composition, as it works to protect the cellular components in the egg cells from free radicals as an electron donor through the thiol group The reaction may occur by itself (such as its interaction directly with the hydroxide radical or hydrogen peroxy).

3.3- concentration of total bilirubin

Table (1) showed a significant decrease at p-valu (P≤0.01) in the obese group of PCOS patients compared to the healthy group. The results in the same table showed a significant increase when comparing obese and non-obese patients. The results of this study agree with the results of the study of Rizzo [(15)] and his group, who indicated a significant decrease in the concentration of total bilirubin for women with (PCOS) , which is attributed to its consumption inside the body to remove oxidation, as it is an internal antioxidant that has the ability to inhibit lipid peroxidation. And the direct removal of difreant free radicals resulting from oxidation and oxidative stress

3.4- concentration of uric acid

Table (1) showed that there were non-significant differences in the concentration of uric acid when comparing women with PCOS with control, and the results indicated a significant increase at p-valu (P≤0.05) in the concentration of uric acid when comparing women with PCOS who are obese with those who are not obese. The results of this study agreed with the findings of Yang [(16)], who indicated that there was a rise in the concentration of uric acid in obese women with PCOS compared with the control, and Hu [(17)] indicated that the reason for the high concentration of uric acid may be related to increased androgen and insulin resistance.

Androgens lead to an increase in the concentration of uric acid in the serum by stimulating the hepatic metabolism of purine nucleotides and promoting the regeneration of purine in the kidneys, as indicated by Ighodaro and his group [(18)], in their study, to the presence of enzymatic defense lines in the human body, and that uric acid belongs to one of these Defensive lines, as it works to search for free radicals to prevent the start of the chain and break its proliferation reactions by donating an electron to it, and in this process the free radicals become less harmful and thus contribute to preserving the tissue from damage or damage, and these new radicals can be easily identified and made completely harmless Mediated by other antioxidants including uric acid.

3.5- Total antioxidant capacity level (TAC)

Table (1) showed a significant decrease at the level of probability ((P≤0.05) in the total capacity of TAC antioxidants in obese women with PCOS compared with the control group, and the results in the same table indicated a significant decrease at the level of probability (P≤0.01) when comparing the concentration of TAC between obese and non-obese patients.The results of this study agree with the results of the study Masjedi [(19)] , that there is a decrease in TAC in women with PCOS, as infection with PCOS leads to the production of free radicals significantly and their participation in the occurrence of a series of reactions leading to Oxidative stress(OS) in the cells of the whole body, that

oxidative stress caused by free radicals is responsible for damage to the structure of cellular membranes,
, which affects the performance of their functions normally [(20)] , and another study indicated that oxidative stress occurs in obese women at a higher rate than in non-obese women, and therefore the decrease in TAC in obese women is higher than in non-obese women [(21)] .

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